Fishery Management Report No. 16-37

2014 Kuskokwim Area Management Report

by

Colton Lipka

Aaron Tiernan

and

Aaron D. Poetter

December 2016

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

FISHERY MANAGEMENT REPORT NO. 16-37

2014 KUSKOKWIM AREA MANAGEMENT REPORT

by
Colton Lipka, Aaron Tiernan, and Aaron D. Poetter
Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1565

December 2016

The Fishery Management Reports series was established in 1989 by the Division of Sport Fish for the publication of an overview of management activities and goals in a specific geographic area, and became a joint divisional series in 2004 with the Division of Commercial Fisheries. Fishery Management Reports are intended for fishery and other technical professionals, as well as lay persons. Fishery Management Reports are available through the Alaska State Library and on the Internet: http://www.adfg.alaska.gov/sf/publications/. This publication has undergone regional peer review.

Colton Lipka, Aaron Tiernan, and Aaron D. Poetter,
Alaska Department of Fish and Game, Division of Commercial Fisheries,
333 Raspberry Road, Anchorage, AK 99518, USA

This document should be cited as follows:
Lipka, C., A. Tiernan, and A. D. Poetter. 2016. 2014 Kuskokwim area management report. Alaska Department of Fish and Game, Fishery Management Report No. 16-37, Anchorage.

The Alaska Department of Fish and Game (ADF&G) administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act (ADA) of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility please write:
ADF&G ADA Coordinator, P.O. Box 115526, Juneau, AK 99811-5526
U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042, Arlington, VA 22203
Office of Equal Opportunity, U.S. Department of the Interior, 1849 C Street NW MS 5230, Washington DC 20240

The department's ADA Coordinator can be reached via phone at the following numbers:
(VOICE) 907-465-6077, (Statewide Telecommunication Device for the Deaf) 1-800-478-3648,
(Juneau TDD) 907-465-3646, or (FAX) 907-465-6078

For information on alternative formats and questions on this publication, please contact:
ADF&G, Division of Sport Fish, Research and Technical Services, 333 Raspberry Rd, Anchorage AK 99518 (907) 267-2375

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Continued)

LIST OF APPENDICES

LIST OF APPENDICES (Continued)

ABSTRACT

The 2014 Kuskokwim Area Management Report is an annual volume reporting on management activities in the Kuskokwim River and Bay, as well as regulation changes by the Alaska Board of Fisheries in March 2014. The report emphasizes a descriptive account of the information, decisions, and rationale used to manage the Kuskokwim River and Bay subsistence and commercial salmon (Chinook *Oncorhynchus tshawytscha*, chum *O. keta*, sockeye *O. nerka*, and coho *O. kisutch*) and Pacific herring *Clupea pallasii* fisheries. All information deemed necessary to fully explain the rationale behind management decisions in 2014 are included. All narrative and data tabulations in this volume are combined in 4 sections: salmon, subsistence, herring, and miscellaneous fisheries, to aid in the use of the document as a reference source. The extensive set of tables has been updated to record previously unlisted data for easy reference. Fisheries data in this report supersedes information in previous reports. Corrections or comments should be directed to the Anchorage office; Attention Editor, Aaron Poetter, Kuskokwim Area Management Biologist, 333 Raspberry Road, Anchorage, Alaska, 99518.

Keywords: Pacific salmon *Oncorhynchus* spp., Chinook salmon *Oncorhynchus tshawytscha*, chum *O. keta*, sockeye *O. nerka*, coho *O. kisutch*, Pacific herring *Clupea pallasii*, subsistence fisheries, commercial fisheries, subsistence, Annual Management Report (AMR), Kuskokwim River, Kuskokwim Bay.

INTRODUCTION

MANAGEMENT AREA DESCRIPTION

The Kuskokwim Management Area (KMA) includes the Kuskokwim River drainage, all waters of Alaska that flow into the Bering Sea between Cape Newenham and the Naskonat Peninsula, and Nunivak and St. Matthew Islands (Appendix A1).

There are 38 communities consisting of approximately 4,800 households within the KMA. Of those households, approximately 75% are situated within the drainage of the Kuskokwim River (Shelden et al. 2014). Much of the salmon fishing effort occurs within the mainstem of the Kuskokwim River; however, fishing also occurs in many of the tributaries that contain salmon. Residents of Quinhagak, Goodnews Bay, and Platinum, located along the south shore of Kuskokwim Bay, harvest salmon stocks primarily from the Kanektok, Arolik, and Goodnews River systems. Residents of Kipnuk, Kwigillingok, and Kongiganak, located on the north Kuskokwim Bay, harvest salmon from within the Kuskokwim River drainage and from local drainages that empty into Kuskokwim Bay. Residents of Toksook Bay, Nightmute, Tununak, Newtok, Chefornak, and Mekoryuk, which are situated near the Bering Sea Coast, harvest salmon from coastal waters and local streams.

There are currently 4 commercial salmon fishing Districts in the KMA: 1, 2, 4, and 5 (5 AAC 07.200). Districts 1, 2, 3, and 4 were established in 1960; however, District 3, Upper Kuskokwim River, was removed from regulation in 1966 due to lack of landings. District 5, Goodnews Bay, was established in 1968 (Appendix A2). District 1, Lower Kuskokwim River, consists of the Kuskokwim River from a line between Apokak Slough and the southernmost tip of Eek Island and Popokamiut upstream to a line between the Alaska Department of Fish and Game (ADF&G) regulatory markers located at Bogus Creek, about 9 miles upstream of the Tuluksak River (Appendix B1). District 1 was divided into 2 subdistricts, 1-A and 1-B, in 2000. Subdistrict 1-A consists of that portion of District 1 upstream from a line between regulatory markers located at the downstream end of Steamboat Slough and includes Statistical Areas 335-13 and 335-14. Subdistrict 1-B consists of that portion of District 1 downstream from regulatory markers at Steamboat Slough and includes Statistical Areas 335-11 and 335-12. District 2, Middle Kuskokwim River, consists of Kuskokwim River from ADF&G regulatory markers located at the upstream entrance to the second slough on the west bank downstream from Kalskag to the

regulatory markers at Chuathbaluk (Appendix B2). The most recent commercial fishing periods in District 2 occurred in 2000, because of a lack of markets. District 4, Quinhagak, consists of Kuskokwim Bay waters from the northern-most edge of the mouth of Weelung Creek to the southern-most tip of the south mouth of the Arolik River and extending for 3 miles from the coast (Appendix C1). District 5 consists of that portion of Goodnews Bay east of a line from ADF&G regulatory markers located approximately 2 miles south and 2 miles north on the seaward side of the entrance of Goodnews Bay, and west of a line between mouth of Ukfigag Creek to the mouth of the Tunulik River (Appendix D1).

MANAGEMENT

Background

The large size of the Kuskokwim River drainage and the distances between the fisheries and escapement monitoring projects throughout the drainage adds complexity to the management of Kuskokwim River. Chinook salmon *Oncorhynchus tshawytscha*, begin entry into the Kuskokwim River in late May, whereas sockeye *O. nerka* and chum *O. keta* salmon begin their entry in mid-June. Chinook and sockeye salmon runs fall off in early July, whereas the chum salmon run begins to fall off in late July when the coho salmon *O. kisutch* run begins. Coho salmon entry to the river falls off in late August to early September. Fishery management information on run size and timing by species is limited until the salmon are distributed throughout the drainage and on the spawning grounds hundreds of miles from and weeks after the lower river fishery has been initiated.

Kuskokwim Bay salmon have similar run timing into the Kanektok, Goodnews, and Arolik rivers. These are small drainages in comparison to Kuskokwim River. Although evaluation of run size and timing in Kuskokwim Bay rivers is not immediate, it is much timelier than that of the Kuskokwim River. Many of the factors that make Kuskokwim River fisheries management difficult are not present in Kuskokwim Bay fisheries.

Small numbers of Chinook salmon are harvested in Kuskokwim River salmon directed commercial fisheries during late June and July under a guideline harvest range of 0–50,000 fish. Directed Chinook salmon fisheries do occur in Districts 4 and 5 when abundance is adequate to allow for a commercial fishery. The harvest of sockeye salmon was considered incidental to chum salmon harvest in Kuskokwim River from 1987 to 2003; however, in 2004, a guideline harvest level of 0–50,000 sockeye salmon was established. Districts 4 and 5 commercial fisheries target sockeye and chum salmon. Coho salmon are targeted in all 3 commercial fishing districts with those fisheries occurring in late July through August.

The KMA commercial fishery was relatively stable from 1987 to 1996 with the harvests ranging from 740,000 to 2.3 million fish (Appendix A3). Effort ranged from 714 to 824 permits fished, and the exvessel value of the fishery ranged from $2.9 million to $12.7 million (Appendix A4). Beginning in 1996, the value of salmon, particularly chum salmon (Appendix A5), began to decline which led to a decrease in fishing effort, number of fish harvested, and the exvessel value of the fishery. From 1997 to 2002, commercial salmon harvests in the area ranged from 758,000 fish in 1998 to 185,000 fish in 2002. Effort ranged from 707 permits in 1998 to 407 permits in 2002, and the exvessel value of the fishery ranged from $1.6 million in 1998 to $324,000 in 2002. Poor Chinook and chum salmon returns during 1999 through 2001 resulted in the Kuskokwim River having limited commercial salmon fishing opportunity in June and July.

Kuskokwim River Chinook and chum salmon abundances rebounded in the mid-2000s, but poor market conditions for chum salmon and limited processing capacity, continued to limit commercial salmon fishing opportunity in District 1. These same factors limited commercial fishing opportunity during July in both Districts 4 and 5, and led to registered buyers imposing harvest limits on fishermen from 2006 to 2008 (Appendix A2). Since 2004, commercial salmon harvests in the area have ranged from 393,700 fish to 687,800 fish (Appendix A3). Effort ranged from 434 permit holders to 530 permit holders, and the salmon exvessel value ranging from $1.1 million to $2.9 million (Appendix A4). A fish processing plant located in Platinum began operation in 2009 and has improved processing capacity in the area. Recent improvements in the chum salmon market and the improved processing capacity led to increased fishing opportunity since 2009. The Bethel based fish processor Kuskokwim Seafoods permanently closed operations in 2013 which limits fish processing in the area to the Platinum facility for the foreseeable future.

Kuskokwim River Chinook salmon are harvested primarily for subsistence uses. Commercial harvests since 1996 have been below average (Appendix B3). Since 2000, Chinook salmon harvests have contributed between 0% and 13% of the exvessel value of the total District 1 commercial salmon fishery (Appendices B4 and B5). Chinook salmon run reconstruction information indicates an exploitation rate of Chinook salmon of approximately 40% since 2000, with the majority of the harvest, 96% attributed to the subsistence fishery (Bue et al. 2012).

Kuskokwim River sockeye salmon are primarily harvested in the subsistence fishery, but are also harvested in District 1 commercial fisheries (Appendix B6). Kuskokwim River commercial sockeye salmon harvests make up approximately 15% of the District 1 total exvessel value (Appendix B4).

Kuskokwim River coho salmon are harvested primarily in the commercial fishery (Appendix B7). Kuskokwim River coho salmon commercial fishing in recent years has accounted for the largest number of salmon harvested and the greatest value, at over half of the District 1 exvessel value (Appendix B4).

Kuskokwim River chum salmon, though an important subsistence species, have been primarily targeted for commercial use (Appendix B8). From 1996 to 2010, commercial chum salmon harvests contributed less than 20% of the total exvessel value of the District 1 commercial salmon fishery. Beginning in 2011, chum salmon harvests have contributed over 40% of the total exvessel value in District 1 (Appendix B4).

In Kuskokwim Bay commercial fisheries, the greatest harvest has been sockeye salmon followed by coho, chum, and Chinook salmon (Appendices C2 and D2). Sockeye salmon have historically had the greatest exvessel value in District 4. However, chum salmon exceeded the exvessel value of sockeye salmon 2011–2013 (Appendix C3). Sockeye salmon have the highest exvessel value in District 5 (Appendix D3).

Salmon Stock Status

Salmon returns to the majority of Western Alaska rivers (including Kuskokwim River) were generally below average from 1997 to 2001. However, these declines were not as evident in Kuskokwim Bay rivers. The KMA was declared an economic disaster area by the State of Alaska in 1997, 1998, 2000, and 2001 because of the extremely low chum and Chinook salmon commercial harvests and exvessel values (Appendix A3). In 2001, Kuskokwim River Chinook

and chum salmon were both designated stocks of yield concern by the Alaska Board of Fisheries (BOF) (Burkey et al. 2000).

In 2002, Chinook and chum salmon returns to the Kuskokwim River began to rebound and reached near record abundances from 2004 through 2007 (Linderman and Bergstrom 2006 and Estensen et al. 2009). This led the BOF to discontinue stock of concern status for both species in the winter of 2007. Since 2007, Chinook salmon abundance has decreased and the lowest total runs occurred in 2012 (Elison et al. 2012) and 2013. The Kuskokwim River was declared a fisheries disaster by the State of Alaska because of low Chinook salmon runs in 2011 and 2012. The Department of Commerce determined that a commercial fisheries disaster occurred under the Magnuson-Stevens Fishery Conservation and Management Act of 1976.

The 2014 Chinook return showed improvement over the previous 3 years. Chum salmon abundance was below average in 2014, and sockeye salmon abundance has varied from average to above average since 2003.Coho salmon abundance had been below average in recent years but 2014 produced above average returns across the drainage.

Run Reconstruction

During the January 2013 BOF meeting, a Kuskokwim River drainagewide Chinook salmon escapement goal was established. The total run of Chinook salmon to the Kuskokwim River from 1976 to 2011 was estimated using a model developed for data-limited situations (Bue et al. 2012). Subsistence harvest, commercial harvest and effort (CPUE), sport fish harvest, test fishery harvest and CPUE at Bethel, mark–recapture estimates of inriver abundance, and counts of salmon at 6 weirs, and peak aerial survey counts from 14 drainages throughout the Kuskokwim River drainage were simultaneously combined to inform the model. The estimates that were generated were then combined with available age structure of the stock information, to reconstruct the total return by age and ultimately develop a brood table. The run reconstruction and brood table were used to conduct a spawner-recruit analysis and develop escapement goal recommendations for Kuskokwim River Chinook salmon (Hamazaki et al. 2012). Subsequently, in 2013 ADF&G established a new Kuskokwim River drainagewide sustainable escapement goal (SEG) of 65,000–120,000 Chinook salmon and revised SEGs for 3 individual rivers with weir assessment projects as follows: Kwethluk River 4,100–7,500, Kogrukluk River 4,800–8,800, and George River 1,800–3,300.

2014 Management Plan

In January of 2013, the BOF adopted a new *Kuskokwim River Salmon Management Plan* (5 AAC 07.365) after thorough public input. ADF&G shall use inseason run projections and test fishing indices to assess run abundance. This information would be evaluated inseason using the Bethel test fishery (BTF) CPUE and subsistence harvest reports. The *Kuskokwim River Salmon Management Plan* provides guidelines for managing the Kuskokwim River salmon fishery to meet escapement goals and subsistence use priority.

The BOF met in March 2014 during which 2 emergency petitions for Kuskokwim Area subsistence salmon fishing were adopted. Dip nets became legal gear for the taking of salmon other than Chinook salmon in times of Chinook salmon conservation and ADF&G gained the ability to restrict subsistence gillnets from 50 fathoms to 25 fathoms in length during times of Chinook salmon conservation.

The Kuskokwim Bay fisheries are managed according to the *District 4 Management Plan* (5 AAC 07.367). These regulations provide ADF&G guidance for establishing commercial fishing periods. There is no specific management plan for the Goodnews Bay fishery (District 5); however, the fishery is managed similar to District 4 except that commercial fishing is delayed until late June to provide for Chinook salmon escapement.

Subsistence

The subsistence salmon fishery in the Kuskokwim Area is one of the largest and most important in the state and one of the largest subsistence salmon fisheries in North America. Many households throughout the region are involved in harvesting, processing, and preserving salmon for subsistence use. Approximately 2,400 households in the Kuskokwim Area annually harvest salmon for subsistence use (Shelden et al. 2014). Many other households, which are not directly involved in catching salmon, participate by assisting family and friends with cutting, drying, smoking, and associated preservation activities (salting, canning, and freezing). Studies conducted by ADF&F Division of Subsistence indicate that fish contribute as much as 85% of the total pounds of fish and wildlife harvested in a community annually, and salmon as much as 53% of the total annual harvest (Coffing et al. 1991).

Alaska Statute Title 16.05.258, *Subsistence Use and Allocation of Fish and Game*, establishes the subsistence use priority for reasonable harvest opportunity consistent with sustained yield, when resources are not abundant enough to provide for all consumptive uses. In 1993, the BOF made a positive finding for customary and traditional use for all salmon in the entire Kuskokwim Area (Appendix A2). In 2001, ADF&G recommended that the BOF amend 5 AAC 01.286 to include a finding of the amounts reasonably necessary for subsistence (ANS) for the Kuskokwim Area using subsistence harvest data through 1999 (Burkey et al. 2000). During the 2013 BOF meeting the ANS ranges for the Kuskokwim Area were revised to 67,200–109,800 Chinook salmon; 41,200–116,400 chum salmon; 32,200–58,700 sockeye salmon; 27,400–57,600 coho; and 500–2,000 pink *O. gorbuscha* salmon, based on data from 1990 to 2011. The ANS range for District 4 (Quinhagak) and District 5 (Goodnews Bay) is 6,900–17,000 salmon, and the remainder of the Kuskokwim Area is 12,500–14,400 salmon.

Cooperative Management Process

The Kuskokwim River Salmon Management Working Group (Working Group) was formed in 1988 by the BOF in response to requests from stakeholders in the Kuskokwim River that sought a more active role in the management of salmon fishery resources (Francisco et al. 1989). The Working Group has become the forum through which inseason management decisions are made regarding Kuskokwim River subsistence, commercial, and sport salmon fisheries. Working Group representative participation in meetings in Bethel and outside the Kuskokwim River drainage allows for an exchange of information between members and fishery managers. Representatives are also able to testify at regulatory meetings in support of Working Group positions. The relationship among Working Group members, managers, and policy makers continues to be fostered, and these interactions are critical to the Working Group process. This relationship ensures that stakeholders remain up-to-date on new information and maintain their direct involvement in the management of the fishery.

The Working Group met 17 times in 2014. During these meetings, fishery management information was presented by Working Group members, state, and federal staff, Tribal organizations, fishery partners, and the public (Shelden et al. 2014). The Working Group

discussed subsistence and commercial fishing reports from members and the public, the lower Kuskokwim River inseason subsistence harvest report (Chavez and Shelden 2014), test fishery project summaries, and reports from weir, tagging, sonar, and aerial survey programs.

FEDERAL SUBSISTENCE PROGRAM

The Alaska National Interest Lands Conservation Act (ANILCA) of 1980 provides a priority for rural Alaska residents for taking fish and wildlife on federal public lands and called for creation of regional advisory councils (RACs) to provide rural resident's input into the Federal Subsistence Program. On October 1, 1999, the Secretaries of Interior and Agriculture published regulations to expand federal involvement in subsistence fisheries to waters in which the federal government claims a federal reserved water right (applicable waters). The Secretary of Interior and the Secretary of Agriculture delegated their authority in Alaska to the Federal Subsistence Board (FSB) to ensure rural residents receive a priority for subsistence taking on federal public lands and applicable waters. Federal subsistence fishing regulations are adopted by the FSB. RACs provide recommendations and information to the FSB, review policies and management plans, provide a public forum and deal with other matters relating to subsistence uses. The FSB may close fishing for other uses on federal public lands and applicable waters if necessary to ensure a priority for federally qualified rural subsistence users.

Federal subsistence fishing schedules, openings, closings, and fishing methods are established in regulation (Department of Interior 36 CFR Part 242 and 50 CFR Part 100). In general, these regulations are the same as those issued for the subsistence taking of fish under Alaska Administrative Code; however, differences in regulations do exist in some cases.

SUBSISTENCE SURVEY

Annual household surveys are conducted by ADF&G to collect information about the harvest and use of salmon in the Kuskokwim Area (Appendices A7–A10). Methods to estimate total annual subsistence harvest have been developed by ADF&G who also collaborates with local tribal organizations to complete the annual postseason harvest surveys (Shelden et al. 2014). Subsistence surveys have been aimed primarily at gathering data on harvest and use of Chinook, chum, sockeye, and coho salmon. Pink salmon are harvested in the Kuskokwim Area; however, they are generally only available during even numbered years. Data for subsistence pink salmon harvests have not been consistently collected during the annual fall survey efforts.

RUN STRENGTH INDICATORS

Salmon managers require timely inseason assessment of salmon run abundance. In the Kuskokwim River, escapement projects provide limited utility in this regard because of the great distances between the areas of harvest and the project locations (Appendix A6). Consequently, managers rely on the Bethel test fishery, commercial catch statistics, and informal reports from subsistence and sport fishermen to augment escapement data.

In the Kuskokwim Bay, escapement monitoring projects are much closer to the commercial fishing districts, therefore escapement data can be more effectively used for inseason management of subsistence and commercial fisheries. Managers also make use of commercial catch statistics and information from subsistence and sport fishermen. Catch statistics are especially important in District 4 where reliable escapement monitoring has been historically lacking.

Bethel Test Fishery

Daily inseason assessment of Kuskokwim River salmon run strength and timing is available from a drift gillnet test fishery operated near Bethel. The project began in 1984 and the methodology has remained largely unchanged (Bue et al. 2012; Appendix B9). The test fishery catch from each tide is tallied by species and distributed to charities. Catch statistics for Chinook, sockeye, chum, and coho salmon are presented as daily CPUE indices and season cumulative CPUE indices by species. Comparisons are made with test fishery results from previous years and relationship to escapement projects to assess relative abundance and run timing. The comparisons are subjective in that managers need to consider variables such as water level, fishing patterns, and changing river morphology when comparing data from between years, and even within years.

From 2012 to 2014, BTF was used as a platform for a sockeye salmon genetics collection project. This project included the use of a 50 fathom gillnet hung with 4.625 inch mesh web. This net was fished after the other 2 gillnets within the test fishery. Sockeye salmon that were captured in the 4.625 inch mesh gillnet were then kept separate from the other catch and sampled as their own group.

Historically, other test fisheries have been attempted in the Kuskokwim River: Kwegooyuk test fishery, 1966–1983 (Baxter 1970; Huttunen 1984); Eek test fishery, 1988–1994; Kuskokwim River subsistence test fishery, 1988–1990 (Kuskokwim Fishermen's Cooperative 1991); Aniak test fishery, 1992–1995, 2015; Chuathbaluk test fishery, 1992–1993; and the Lower Kuskokwim River test fishery, 1995. Most of these projects were initiated at the prompting of groups other than ADF&G. They were all eventually discontinued for a variety of reasons including lack of funding, consistency problems, difficulties with catch disposition, and ambiguous results.

Inseason Subsistence Catch Monitoring

Inseason interviews of subsistence fishermen have been conducted in the Bethel area by Orutsararmiut Native Council (ONC) technicians, in cooperation with ADF&G since 2001. The Fisheries Information Services (FIS) Division of the U.S. Fish and Wildlife Service (USFWS) Office of Subsistence Management (OSM) provides funding for this cooperative program under the *Kuskokwim River salmon inseason subsistence catch monitoring* project (FIS 10-354; Chavez and Shelden 2014). Information from the interviews, in combination with other fisheries information, is used to assess salmon run timing and relative abundance. Additionally, this program provides timely insight into the subsistence fishery; a relative index of catches based on those interviewed, and allows an avenue for local user input into the management process. Summaries of interview responses are presented to the Working Group, throughout the subsistence fishing season (Peeks and Shelden 2015). Fishery managers and the Working Group use these summaries in the decision-making process for the Kuskokwim River subsistence and commercial salmon fisheries.

2014 COMMERCIAL SALMON FISHERY

A total of 343,696 salmon were commercially harvested in the Kuskokwim Area (Appendix A11). A total of 457 individual permit holders participated in area fisheries, which generated an estimated exvessel value of $2,286,649. The exvessel value was above the most recent 10-year average value (Appendix A11).

Kuskokwim River

The District 1 commercial fishing season began on July 14 and ended on August 26 with a total of 8 commercial fishing periods (Appendices A12 and B10). The initiation of the commercial fishery was delayed until the majority of the Chinook salmon run had passed through the district to ensure ongoing Chinook salmon conservation. As a result, commercial fishing occurred after the peak of the sockeye and chum salmon runs had passed through District 1, resulting in well below average catches. Only Subdistrict 1-B was open to commercial salmon fishing. The first 3 fishing periods targeted chum salmon and the remaining periods targeted coho salmon (Appendix B10). There was concern from the public about the amount of commercial harvested chum and coho salmon because subsistence users may utilize more of these species due to the much reduced subsistence harvest of Chinook salmon. The coho salmon fishery was delayed until August 11 and fishing periods were spread out to allow passage of coho salmon between periods.

The District 1 commercial harvest was 0 Chinook, 2,720 sockeye, 117,588 coho, and 19,080 chum salmon (Appendices A11 and B10). An additional 35 Chinook salmon were harvested during the commercial fishery and reported on fish tickets as retained for personal use because buyers agreed not to purchase Chinook salmon due to the ongoing conservation efforts. These fish are included in subsistence harvest through the postseason subsistence harvest survey methodology. Chum and sockeye salmon harvest were well below the most recent 10-year average and the chum harvest being the second lowest since 2003 (Appendix A11). Coho salmon harvest was slightly below the most recent 10-year average. Total exvessel value of the fishery was $843,356; which is above the most recent 10-year average (Appendices A11 and B4). A total of 358 individual permit holders recorded landings in District 1 during the 2014 season (Appendix B10), which is similar to the most recent 10-year average of 358 permit holders (Appendix A4).

Kuskokwim Bay

Subsistence salmon fishing in District 4 was closed on Sundays during the month of June in an effort to conserve Chinook salmon returning to the Kanektok River. The District 4 (Appendix C1) commercial salmon fishing season opened July 9 and ended on August 27. There were 18 commercial fishing periods within that time frame (Appendix C4). The commercial fishing season was delayed from the normal start of June 15 due to concerns for Chinook salmon abundance. On July 9, sockeye salmon abundance greatly exceeded Chinook salmon and by regulation management was directed towards sockeye salmon, which allows for 3 periods per week. However, fishing periods were suspended the last week of July for 7 days in response to low abundance of salmon in the fishing district. This is typical for this time of year while fishermen and managers wait for coho abundance to increase. Commercial fishing resumed August 4 with 3 periods a week for the remainder of the season. Subsistence fishing was closed 16 hours before, during, and 6 hours after commercial fishing periods.

A total of 2,265 Chinook, 58,879 sockeye, 52,317 coho, and 14,563 chum salmon were commercially harvested in District 4 (Appendix C4). Chinook, sockeye, and chum salmon harvest were below average. A large surplus of sockeye salmon was not harvested because of delaying the fishery to conserve Chinook salmon. Coho salmon harvest was above the most recent 10-year average (Appendix C2). The Chinook salmon harvest was the second lowest since 1967 and similar to the 2013 harvest (Appendix C2). On average fisherman were paid $1.00 per

pound for Chinook salmon, $1.25 per pound for sockeye salmon, $0.96 per pound for coho salmon, and $0.60 for chum salmon. Total exvessel value of the fishery was $858,639; which is near the most recent 10-year average value (Appendix A11). A total of 194 individual permit holders (making at least one recorded landing) participated in the commercial fishery.

Subsistence salmon fishing in District 5 was restricted to 6 inch or smaller mesh gillnets from June 2 through June 30 in an effort to conserve Chinook salmon returning to the Goodnews River. The District 5 commercial fishing season began on July 9 and ended on August 27. There were 17 commercial fishing periods (Appendix D3). The commercial salmon season was delayed until July 9, due to concerns for Chinook salmon abundance. Around this time abundance of sockeye and chum salmon exceeded that of Chinook salmon as the prevalent species available for harvest. The district fishing area was not reduced in 2014 to conserve Chinook salmon like it was in 2013 because of the long delay in opening the fishing season resulted in a low Chinook salmon harvest. District 5 was opened to 3 commercial periods per week and the same suspension of fishing activity the last week of July that was issued in District 4. The first Subsistence fishing was closed 16 hours before, during, and 6 hours after commercial fishing periods.

A total of 205 Chinook, 20,515 sockeye, 52,158 coho, and 3,403 chum salmon were commercially harvested in District 5 (Appendix D2). Coho salmon harvest was approximately 69% above the most recent 10-year average (2004–2013). Chinook, sockeye, and chum salmon harvests were below the most recent 10-year averages (89%, 36%, and 74% respectively; Appendix D2). The Chinook salmon harvest was the lowest since 1972. On average fisherman were paid $1.00 per pound for Chinook salmon, $1.25 per pound for sockeye salmon, $0.96 per pound for coho salmon, and $0.60 for chum salmon. Total exvessel value of the fishery was $584,655; which is approximately 50% above the most recent 10-year average value (Appendix A11). A strong return of coho salmon to District 5 resulted in the highest exvessel value for that species, since 1994. Chinook salmon exvessel value was the lowest since 2002 (Appendix A4). A total of 61 individual permit holders (making at least one recorded landing) participated in the fishery.

2014 SUBSISTENCE SALMON FISHERY

The 2014 preseason Chinook salmon forecast was 71,000–116,000 fish, which was well below the average total run of 260,000 fish. The drainagewide SEG is 65,000–120,000 Chinook salmon. Average subsistence harvest is approximately 84,000 Chinook salmon. If the run came back as forecast, then there would not have been enough Chinook salmon to provide for escapement and subsistence uses. Due to poor Chinook salmon runs in 2012 and 2013 in addition to a low forecast, the 2014 runs in the Kuskokwim Area were the most conservatively managed on record. Subsistence fishing in the mainstem of the Kuskokwim River was restricted at the start of the season.

In 2014, the Chinook salmon fishery within the boundaries of the Yukon Delta National Wildlife Refuge was managed by USFW under special actions through July 2. On April 17, the Federal Subsistence Board adopted a special action to close the Kuskokwim Chinook salmon fishery to non-federally qualified users within the boundary of the Yukon Delta National Wildlife Refuge. Subsistence fishing in the Kuskokwim River was restricted to the use of gillnets with 4.0 inch or less mesh size not to exceed 60 feet in length within the Yukon Delta National Wildlife Refuge boundaries beginning May 20 downstream of Tuluksak, and on May 27 between Tuluksak and

Aniak. This restriction was also implemented by ADF&G upstream of the refuge boundary above Aniak beginning June 1. Fishing for Chinook salmon with hook and line gear was closed drainagewide beginning May 1. An area at the mouth of the Kuskokwim River (east of the Ishkowik River to the northern boundary of District W-4) was also closed to subsistence fishing in order to provide additional protection to Chinook salmon entering the Kuskokwim River. Furthermore, subsistence gillnet fishing in marine waters from the mouth of the Kuskokwim River west to Naskonat Peninsula was restricted to 6 inch or smaller mesh gillnets from June 3 through June 30 to conserve migrating Chinook salmon. This was the first time subsistence fishing restrictions have been implemented in this area.

Under the management plan, during subsistence salmon fishing closures, 4.0 inch or less mesh size gillnets not to exceed 60 feet in length are allowed to harvest non-salmon species such as whitefish, northern pike, and burbot. Through emergency petitions to BOF in an effort to provide opportunity for other salmon species besides Chinook salmon, the BOF approved hand operated dip nets as legal gear for subsistence harvest of salmon and authorized ADF&G to restrict the length of subsistence gillnets from 50 fathoms to 25 fathoms during times of Chinook salmon conservation.

Use of fish wheels were allowed beginning June 19 upstream of the refuge boundary above Aniak until further notice but were required to have a live box with no less than 45 cubic feet of water, be checked at least every 6 hours, and all Chinook salmon must be returned to the water alive. Dip nets were allowed in state waters for subsistence harvest beginning June 15 through June 30 and then extended to July 12. All Chinook salmon caught in a dip net were required to be returned to the water immediately and unharmed. Working cooperatively with ADF&G managers the USFWS manger issued the first 6.0 inch mesh gillnet opportunity on June 20 for 4 hours, below the Johnson River, to harvest sockeye and chum salmon. Subsequent opportunities were provided on June 24 for 8 hours in Section 2; June 27 for 8 hours in Sections 2 and 3 and Section 1 being opened until further notice; June 30 for 8 hours in Section 4 and Sections 2 and 3 opened until further notice; and on July 3 Sections 4 and 5 were opened to 6.0 inch or less mesh gillnets not to exceed 50 fathoms in length until further notice. On August 4 the remaining Chinook salmon conservation measures were rescinded allowing unrestricted subsistence salmon fishing for the entire drainage.

Due to the early season subsistence fishery closures, BTF was not a good indicator of Chinook salmon run timing (Appendix B9). The BTF cumulative CPUE was near the 10-year average but due to the significant reduction in early season subsistence harvest the CPUE was probably inflated when compared to historical data (Appendix B11). With this uncertainty in run timing and strength managers used a cautious and conservative approach to the 2014 fishing season. Postseason run reconstruction of escapement and harvest data estimated the 2014 run to be below average but improved over the previous 4 years. Fishermen were informed after the season that the subsistence restrictions implemented at the start of the run were warranted. Subsistence salmon fishing was closed a total of 31 days from May 20 through June 20. Additionally, subsistence salmon fishing was closed by emergency order 6 hours before, during, and 3 hours after commercial fishing periods.

SUBSISTENCE HARVEST

Subsistence harvests of salmon remained relatively stable from 1990 to 2011. The 2012–2014 Chinook salmon harvest declined as a result of a poor run and subsistence salmon fishing

restrictions (Appendices A7–A10 and A12). The 2014 total subsistence salmon harvest estimates for the Kuskokwim Area were 15,434 Chinook, 54,749 sockeye, 51,168 coho, and 70,687 chum salmon (Appendices A7–A10 and A13). The Chinook salmon subsistence harvest was below the most recent 10-year (2004–2013) average. The sockeye, coho, and chum salmon harvests were above their respective 10-year averages. Residents of communities in the lower Kuskokwim River (from Tuluksak to Eek), took 80% of the subsistence salmon harvest. The lower river communities are relatively densely populated and approximately 76% of the total number of households in the Kuskokwim Area.

ESCAPEMENT

The large size, remoteness, and geomorphic diversity of the Kuskokwim Area present challenges to monitoring salmon escapements and assessing salmon run abundance. For the past 2 decades, efforts have been taken to expand coverage and apply new technologies toward the goal of improving estimation of salmon run timing and run strength monitoring by comparison of current year to historic information. Aerial spawning ground surveys have been the most cost-effective means of monitoring salmon escapements. The more thorough projects such as weirs, counting towers, and sonar have been operated in only a few locations because of costs and limited utility. Since 2000, the number of escapement projects in the Kuskokwim Area has increased through cooperative partnerships with federal agencies and local organizations (Appendix A6). These cooperative efforts have added substantially to our ability to monitor salmon escapements and to evaluate the effectiveness of management actions postseason.

There are currently 25 established escapement goals on tributaries of the Kuskokwim River; 14 Chinook, 3 chum, 3 coho, and 4 sockeye salmon goals (Appendices B11–B14; C5–C6; and D5–D6). Comprehensive reviews of escapement data for most Kuskokwim Area goals are conducted in unison with the Kuskokwim Area BOF cycle. The most recent review was done in the later part of 2012 for the 2013 BOF meeting (Conitz et al. 2012). A new drainagewide SEG for Kuskokwim River Chinook salmon of 65,000–120,000 fish was established. There were 3 revisions to existing weir based escapement goals. The George River Chinook salmon SEG was revised from 3,100–7,900 fish to 1,800–3,300 fish. The Kogrukluk River Chinook salmon SEG was revised from 5,300–14,000 fish to 4,800–8,800 fish. The Kwethluk River Chinook salmon SEG was revised from 6,000–11,000 fish to 4,100–7,500 fish. These revisions were constructed in concert with the spawner-recruit analysis used to establish the drainagewide SEG for Chinook salmon. In addition, the Tuluksak River weir Chinook salmon SEG and the Kanektok River aerial survey chum salmon SEG were discontinued.

Throughout the Kuskokwim Management Area in 2014, Chinook, sockeye, and chum salmon escapements were below average. Coho salmon escapements were above average and it was estimated to be a strong return. Sockeye, chum, and coho salmon escapements goals were achieved or exceeded in all systems with established goals. Chinook salmon escapements were below the escapement goals in 2 of the 3 systems with weir based escapement goals and 6 of 9 aerial survey escapement goals were achieved. The drainagewide escapement goal was achieved (Appendix B5).

2014 ESCAPEMENT ASSESSMENT

Numerous escapement assessment projects exist throughout the Kuskokwim River drainage and Kuskokwim Bay drainages (Appendix A14). Below is a summary of salmon escapement at each

project for 2014. Please refer to Hansen and Blain (2014) for specifics such as methods, daily passage counts, climate and hydrological information, and escapement age, sex, and length (ASL) information. The *AYK Database Management System* contains historical as well as current ASL information from the various escapement monitoring projects (past and present), as well information from the area commercial and subsistence harvests (http://www.adfg.alaska.gov/CommFishR3/WebSite/AYKDBMSWebsite/Default.aspx).

Kuskokwim River

Kwethluk River Weir

Kwethluk River weir salmon escapements included 3,187 Chinook, 3,776 sockeye, 17,941 chum, and 43,945 coho salmon during the June 25–September 10 operational period (Appendices B11–B14). The Chinook salmon escapement was below the SEG range of 4,100–7,500 and the coho salmon escapement exceeded the SEG threshold of 19,000 fish.

Tuluksak River Weir

Tuluksak River weir salmon escapements included 320 Chinook, 514 sockeye, 8,724 chum, and 13,797 coho salmon during the June 30–September 10 operational period (Appendices B11–B14). The Chinook and chum salmon escapements were below average whereas the sockeye and coho salmon escapements were above average.

Salmon River Weir (Aniak)

Salmon River weir salmon escapements included 1,757 Chinook, 894 sockeye, 2,890 chum, and 8,254 coho salmon during the June 15–September 20 operational period (Appendices B11–B14). The Chinook, sockeye, and chum salmon escapements were below average whereas the coho salmon escapement was above average.

George River Weir

George River weir salmon escapements included 2,993 Chinook, 156 sockeye, 17,148 chum, and 35,771 coho salmon during the June 15–September 20 operational period (Appendices B11–B14). The Chinook salmon escapement was within the SEG range of 1,800–3,300 fish. The sockeye and coho salmon escapements were above average whereas the chum salmon escapement was below average.

Kogrukluk River Weir

Kogrukluk River weir escapements included 3,732 Chinook, 6,413 sockeye, 30,763 chum, and 52,975 coho salmon during the June 20–September 25 operational period (Appendices B11–B14). The Chinook salmon escapement was the second lowest on record since the project was initiated in 1976 and the goal of 4,800–8,800 was not met. The escapement goal for sockeye salmon of 4,400–17,000 fish and the chum salmon escapement goal of 15,000–49,000 fish were achieved, and the escapement goal for coho salmon of 13,000–28,000 fish was exceeded.

Tatlawiksuk River Weir

Tatlawiksuk River weir escapements included 1,905 Chinook, 12,455 chum, and 19,814 coho salmon during the June 15–September 20 operational period (Appendices B11 and B13–B14). The Chinook and coho salmon escapements were above average, and chum salmon escapement was well below average and the third lowest escapement since 1998.

Telaquana River Weir

Telaquana River sockeye salmon escapement was 24,293 sockeye during the July 2–August 26 operational period (Appendix B12). This was the fifth year of operation for this project.

Kuskokwim Bay

Kanektok River Weir

The Kanektok River weir escapements included 3,594 Chinook, 259,406 sockeye, and 18,602 chum salmon during the June 25–August 15 operational period (Appendix C5). Escapement estimates for coho and pink salmon are incomplete because the project does not operate through the entire coho run and weir picket spacing allows pink salmon to pass unmonitored. No formal escapement goals for any species have been established at the weir. The escapements for Chinook and chum salmon were below average whereas sockeye salmon escapement was well above average.

Middle Fork Goodnews River Weir

The Middle Fork Goodnews River weir escapements included 750 Chinook, 41,473 sockeye, and 11,518 chum salmon during the June 25–August 30 operational period (Appendix D5). The Middle Fork Goodnews River weir has historically had many operational difficulties during September monitoring coho salmon. Due to these annual difficulties, the operational period was adjusted to cease operations annually on August 30. Chinook salmon escapement was below the biological escapement goal (BEG) of 1,500–2,900 fish. Escapements of chum and coho salmon did not meet their respective SEG lower bound goal of 12,000 fish but sockeye salmon exceeded the SEG range of 18,000–40,000 fish.

AERIAL SURVEYS

Aerial survey based escapement goals do not represent the entire spawning populations in the respective streams. The surveys are conducted one time each season during a window of time when the maximum numbers of fish are expected to be on the spawning grounds. The estimates of salmon observed during aerial surveys represent minimum escapements. The escapement goals developed from these surveys are based on the raw, unexpanded counts; therefore, each count serves as an index of abundance rather than a complete census.

Aerial surveys are generally conducted on clear water streams, lakes, and coastal streams throughout the KMA. Tributaries in the middle and upper Kuskokwim River are often stained from organics or clouded by glacier runoff, both of which markedly reduce the visibility of fish. Aerial surveys are best directed at indexing spawning populations of Chinook and sockeye salmon because these fish are typically more visible than chum and coho salmon.

Kuskokwim River

Lower Kuskokwim River

Aerial surveys for Chinook salmon were conducted on lower river tributaries (Appendix A15) in 2014. Weather and stream conditions in the lower river were generally fair with 2 of 4 tributaries having quality survey data. An SEG range of 400–1,200 Chinook salmon has been established for the Kisaralik River and the 2014 survey was within the range and 622 fish observed (Appendix B15).

Upper Kuskokwim River

Aerial surveys for Chinook salmon were conducted on the Aniak, Kipchuk, Salmon, Holokuk, Holitna, Gagarayah, Cheenetnuk, Oskawaluk, Salmon (Pitka Fork) rivers in 2014 (Appendix A15 and B15). Escapement goals have been established for Aniak, Salmon, Gagarayah, Cheenetnuk, Holitna, and Salmon (Pitka Fork) rivers. Good survey conditions allowed ADF&G staff to fly all of the systems in this section of the drainage. Index estimates from the upper Kuskokwim River tributaries were below average yet the established SEGs were met or exceeded at all systems with the exception of the Holitna River where conditions did not meet the acceptable survey criteria for an estimate to be made (Appendix B15).

Kuskokwim Bay

Kuskokwim Bay

The Kanektok River aerial Chinook salmon survey did not meet acceptable criteria for an estimate to be made, and the sockeye salmon SEG range of 14,000–34,000 was exceeded and 136,400 fish observed (Appendix C6). The Goodnews River aerial Chinook salmon SEG range of 640–3,300 was not achieved and 630 fish observed, and the sockeye salmon survey did not meet acceptable criteria for an estimate to be made (Appendix D6).

KUSKOKWIM HERRING FISHERY

MANAGEMENT AREA

The Kuskokwim Management Area includes all waters of Alaska that flow into the Bering Sea between Cape Newenham and the Naskonat Peninsula (lat 60°58.17′N, long 165°11′W) to 3 miles seaward as well as the waters surrounding Nunivak and St. Matthew Islands to 3 miles seaward (5 AAC 27.870) (Appendix E1). This area supports a significant subsistence Pacific herring *Clupea pallasii* fishery and is divided into 5 commercial sac roe fishing districts.

Security Cove District includes all waters between the latitude of Cape Newenham and the latitude of the Salmon River (lat 58°51.83′N).

Goodnews Bay District includes the waters of Goodnews Bay east of a line between the north spit (lat 59°03.58′N, long 161°49.17′W.) and south spit (lat 59°02.92′N, long 161°49.08′W) at the mouth and west of a line between Ukfigag Creek (lat 59°04.17′N, long 161°36′W) and Tunulik River (lat 59°00.08′N, long 161°00.37′W).

Cape Avinof District consists of all waters landward of Kikegtek, Pingurbek and Kwigluk Islands from the longitude of Ishkowik River (long 162°44′W) to the latitude of the Tern Mountain (lat 60°42′N).

Nelson Island District consists of all waters north of Chinigyak Cape (lat 60°27′N) and east of Atrnak Point (long 165°15′W), and all waters north of Talurarevuk Point (lat 60°35′N) and south of the southernmost tip of Chinit Point (lat 60°36′N) and east of long 165°30′W and all waters north of the northernmost tip of Chinit Point (lat 60°37′N) and south of Kigigak Island (lat 60°49′N) and east of long 165°30′W.

The Nunivak Island District includes all waters extending 3 miles seaward of mean low water along the northern, eastern, and southern sides of Nunivak Island from Kikoojit Rocks (lat 60°20′N, long 166°40′W) to Cape Mendenhall (lat 59°45.17′N, long 166°07′W) (5 AAC 27.875).

FISHERY MANAGEMENT

The *Bering Sea Herring Fishery Management Plan* (5 AAC 27.060) requires minimum spawning biomass thresholds for each district before commercial fishing. The thresholds are: Security Cove, 1,200 short tons (st); Goodnews Bay, 1,200 st; Cape Avinof, 500 st; Nelson Island, 3,000 st; and Nunivak Island, 1,500 st. This plan sets the maximum exploitation rate at 20% of the estimated spawning biomass for Security Cove, Goodnews Bay, Nunivak Island, and Nelson Island. Other regulations further reduce the maximum allowable exploitation rate in the Cape Avinof District to 15% of the estimated available biomass and directs management in the Nelson Island District to include 200 st of the 20% exploitation rate for subsistence (5 AAC 27.895).

All commercial herring fisheries are opened and closed by emergency order for an orderly fishery and to allow periodic assessment of herring biomass. ADF&G attempts to harvest stocks in good condition (large volume, increasing abundance, good recruitment) at the upper end of the exploitation range (15–20%). Stocks in poor condition (small volume, decreasing abundance, poor recruitment) are exploited at lower than maximum rates (0–15%).

Commercial Fishery Overview

The Kuskokwim Area commercial herring fishery was initiated in 1977 in Security Cove and Goodnews Bay districts with the first documented deliveries in 1978 in Security Cove District and 1979 in Goodnews Bay District. In 1978 purse seines were allowed in Security Cove District; however, since that time the fishery has been limited to gillnets. Spawn-on-kelp fisheries were prohibited in 1978 before fisheries were established. Initially these herring fisheries were managed through open seasons and guideline harvest levels. In 1981, emergency order authority was established to provide for an orderly fishery and periodic assessments of herring biomass. A minimum threshold herring abundance of 800–1,000 st or spawning activity was established before implementation of the fishery and the guideline harvest levels were established not to exceed 20% of estimated herring biomass. The length of gillnet was established at 100 fathoms. In 1986, the northern boundary of Security Cove was moved from Carter Spit south to the latitude of Salmon River (lat 58°52′N) to provide spatial separation between Security Cove and Goodnews Bay districts. By 1987 the minimum inseason biomass threshold was established at 1,200 st and the Goodnews Bay District was designated a superexclusive use area by BOF limiting permit holder and vessel participation in the commercial fishery. In 1997, a moratorium on entry into the Goodnews Bay fishery was initiated limiting participation in the fishery to 182 permits. The Goodnews Bay superexclusive use area designation was later repealed by the BOF in 2004.

In 1985, commercial herring fishing was initiated in Nelson and Nunivak Island districts. Emergency order authority was established to open and close these fisheries to provide for an adequate subsistence harvest, and orderly commercial fishery, and to allow for periodic re-assessments of herring biomass. A minimum threshold herring abundance of 1,100–1,700 tons or spawning activity was established before implementation of the fishery with a guideline harvest level set at 10% of estimated returning biomass to provide protection for the subsistence fisheries. Gillnet length was limited to 100 fathoms. In 1986, the waters within Nelson Island District from Atrnak Point and Talurarevuk Point, and the waters between the southern and northern edges of Chinit Point were closed by emergency order at the request of local governing groups to prevent interference with the subsistence fishery. By 1988, these waters were closed to

commercial herring fishing by regulation. Beginning in 1987, mechanical shakers were eliminated in Nelson and Nunivak Island fisheries and vessel length was limited to 30 feet. Both districts were designated as combined superexclusive use areas. Implementation of the superexclusive use designation with vessel length restrictions and prohibition of mechanical shakers was in response to requests from fishermen living in communities adjacent to the fisheries. These fishermen believed it would be in the best interest of the fisheries to standardize equipment to help prevent over investment and to limit participation by allowing fishermen to only participate in one herring fishery (Whitmore et al. 2005).

The combined superexclusive use designation allows for fishermen holding permits for both Nunivak and Nelson Island fisheries to participate in commercial herring fisheries in both districts during the same season. In 1987, the minimum inseason biomass threshold was increased to 2,500 st, and the commercial guideline harvest level was increased from 10% to a maximum of 15% of estimated biomass in both districts. In December 1997, the BOF adopted a proposal that raised the Nelson Island District harvest level to 20% of the available biomass minus 200 st allocated for subsistence use and increased the commercial guideline harvest level to 20% of the estimated biomass for the Nunivak Island District. In 1987, the Commercial Fisheries Entry Commission (CFEC) initiated the first steps toward limited entry status in the Nelson Island and Nunivak Island districts and both districts were given limited entry status in 1990. In the winter of 2000, the BOF adopted regulations to allow for development of a cooperative herring purse seine fishery in Nunivak Island District and made the regulation permanent in 2001. In 2006, the Alaska Supreme Court determined that authorizing cooperative fisheries of any sort was beyond the BOF authority. Consequently, the management plan for gillnet and cooperative purse seine fishery in the Nunivak Island District was repealed by the BOF in 2006 (5 AAC 27.894).

In 1988, commercial herring fishing was initiated in the Cape Avinof District. A minimum threshold herring abundance of 500 st or spawning activity was established before implementation of the fishery and a guideline harvest level was established not to exceed 15% of the estimated biomass. The commercial herring fishery established the use of gillnets up to 100 fathoms in length, mechanical shakers were prohibited, vessel length was limited to 30 feet, and a superexclusive use designation was established.

Kuskokwim Area herring fisheries developed rapidly in response to the relative strong market for herring sac roe. During 1981–1984, an average of 206 fishermen harvested 1,400 st of herring and an average value of $477,000 in Security Cove and Goodnews Bay districts. Addition of Nelson and Nunivak Island fisheries in 1985 and the Cape Avinof fishery in 1988 resulted in an average of 442 fishermen harvesting an average of 2,200 st of herring and an average value of $1.33 million during 1985–1989. During the 1990 and 1991 seasons, fishermen participation, harvest levels and values decreased in response to a decline in herring abundance caused by a lack of recruitment of younger age herring into the fishery. Additional year classes of herring began recruiting to the fishery in 1992. The fishery peaked in 1996 when 802 fishermen harvested over 5,000 st of herring valued at $3.5 million. Although harvest levels remained high during 1997 to 1999 seasons, value declined. The trend in declining markets was followed by an annual reduction in effort and harvest levels which continued through the 2006 season, during which 32 fishermen harvested 390 st of herring valued at $70,000. The decline in markets for herring sac roe continued and no commercial fishing occurred from 2007 through

2012. The 2013 season saw a small commercial effort and 28 permit holders harvested 646 st of herring (Appendix E2).

2014 Commercial Herring Fishery

In 2014, there was no market for Kuskokwim Area herring. With a flooded market and large quantities of unsold fish, the price for herring at the time of the Kuskokwim fishery was near $60.00 per a st. At this price and no secure market for sale, local Kuskokwim processors elected to not participate in the fishery. Corresponding with this decision ADF&G did not open the fishery.

Subsistence Fishery

Subsistence fishing for Pacific herring in the northeastern Bering Sea is very important in villages of the Yukon-Kuskokwim River delta. Primarily residents of the coastal villages of Kwigillingok, Kongiganak, Kipnuk, Chefornak, Toksook Bay, Nightmute, Tununak, and Newtok participate in the subsistence fishery. Herring stocks utilized by the subsistence fishery are the same stocks targeted by the commercial fishery.

Subsistence harvest surveys occurred sporadically in Kuskokwim delta villages during 1975–1996 and surveys conducted annually in Nelson Island villages from 1985 to 1996. Subsistence survey results reflect harvest trends and reported catches represent minimum figures because not all area villages were surveyed and not all fishermen were contacted in those communities. No subsistence herring surveys have been conducted in the Nelson Island District since 1996 or in the Nunivak Island District since 1993. Available data suggests that Nelson Island villages harvest approximately 110 st of herring annually (Burkey et al. 1998).

STOCK ASSESSMENT

The remoteness of the Kuskokwim Area herring fishing districts present challenges in assessing abundance, implementing fisheries, and monitoring escapement toward sustained yield fishery management. Although the fisheries typically occur in a northward progression, herring fishery and spawn timing is quite similar.

When the market conditions were strong and the Kuskokwim herring fishery was active, there was an intensive aerial survey program that included contracting a survey aircraft for the duration of the season. The pilot and observer would station out of field camps at the herring districts. Starting around 2004 this effort was reduced to flying opportunistic surveys with chartered aircraft from Bethel. Due to a lack of market interests in recent years, funding for herring assessment and management was reallocated to other programs. As a result surveys were not flown during the 2011 and 2012 seasons in any of the herring districts. In 2013 and 2014, Coastal Villages Seafood's provided the necessary funding needed to conduct aerial surveys and limited test fishing within the Kuskokwim Area.

As a result of the declining interest in the commercial sac roe herring market, the ADF&G test fishing program has been reduced from as many as 6 field camp projects in the 1990s, to only 2 test fishing projects in 2010 and 2013, no test fishing projects were operated in 2011 or 2012, and one test fishing project in 2014.

If the herring market rebounds, aerial survey data collection methods will be similar to those used since 1978. Standard conversions of 1.52 st/538 ft^2 (water depths less than 16 ft), 2.58

st/538 ft^2 (water depths between 16 and 26 ft), and 2.83 st/538 ft^2 (water depths greater than 26 ft) were used to convert estimated herring school surface areas to biomass.

Test fishing with variable mesh gillnets (VMG) is used to collect samples of herring to determine age, sex, size, and sexual maturity of the run, and to note occurrence of other schooling fishes. This sampling program was important to determine herring stock status and to make biomass projections. The last year of data collection from the Goodnews Bay and Nelson Island Districts occurred in 2010. The last year of data collection from Security Cove District was in 2003, from the Cape Avinof District in 2001, and from the Nunivak Island District in 1999. If the catch sampling program is reinstated in the future, in the absence of data from the Security Cove District, VMG data from Goodnews Bay is used to estimate the metrics for the Security Cove District. VMG data from Nelson Island has been used to estimate the metrics for the Nunivak Island and Cape Avinof districts.

2014 STOCK ASSESSMENT

GOODNEWS BAY DISTRICT

Aerial surveys of the Goodnews Bay District began May 10; herring were observed on the first flight and provided the largest observed biomass of herring of 14,162 st (Appendix E3). The second highest biomass was 1,404 st observed on May 13.

Test fishing using VMG was conducted in Goodnews Bay and 580 samples were collected. Of those samples collected, approximately 40% were between the ages of 6- and 8-years-old (Appendix E4). For a total age break out in comparison to the total estimated biomass, refer to Appendix E6.

SECURITY COVE DISTRICT

Aerial surveys of the Security Cove District began May 10; herring were observed on the first flight and provided the largest observed biomass of herring of 15,874 st (Appendix E3). The second highest biomass was 6,032 st observed on May 13.

JACKSMITH BAY DISTRICT

Aerial surveys of the Jacksmith Bay District occurred on May 10 and May 13; however, survey conditions were poor and a biomass estimate was not obtainable (Appendix E3.

CAPE AVINOF DISTRICT

Aerial surveys of the Cape Avinof District occurred on May 11 and May 14; however, survey conditions were poor and a biomass estimate was not obtainable (Appendix E3).

NELSON ISLAND DISTRICT

Aerial surveys of the Nelson Island District began May 11 and an estimated 510 st of herring were observed. The largest observed biomass of herring on record for this district was 58,285 st on May 14 (Appendix E3).

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the Commercial and Subsistence staff of the Bethel and Anchorage offices of the Alaska Department of Fish and Game for their contributions to this report.

We also wish to thank the Kuskokwim River Salmon Management Working Group members who are dedicated and volunteer their services in the cooperative management process. We also extend our thanks to the following organizations, the Orutsararmiut Native Council, Native Village of Quinhagak, Kuskokwim Native Association, the Association of Village Council Presidents, the U.S. Fish and Wildlife Service, the Office of Subsistence Management, Coastal Villages Region Fund, and all the communities of the Kuskokwim Area. Special thanks goes out to Coastal Villages Regional Fund and Coastal Villages Seafood's for providing the funding necessary to conduct the 2014 herring aerial survey and test fishing program and for supporting weir programs on the Kanektok and Goodnews rivers.

REFERENCES CITED

Baxter, R. 1970. Kuskokwim test fishing studies, 1966–1970. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim Salmon Test Fishing Report No. 1, Anchorage.

Bue, B. G., K. L. Schaberg, Z. W. Liller, and D. B. Molyneaux. 2012. Estimates of the historic run and escapement for the Chinook salmon stock returning to the Kuskokwim River, 1976-2011. Alaska Department of Fish and Game, Fishery Data Series No. 12-49, Anchorage.

Burkey, C., Jr., C. Anderson, T. Cappiello, M. Coffing, D. Huttunen, J. Menard, D. B. Molyneaux, C. Utermohle, and T. Vania. 1998. Annual management report for the subsistence and commercial fisheries of the Kuskokwim area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A98-11, Anchorage.

Burkey, C., Jr., M. Coffing, D. B. Molyneaux, and P. Salmone. 2000. Kuskokwim River Chinook salmon stock status and development of management/action plan options, 2000. Alaska Department of Fish and Game, Regional Information Report 3A00-40, Anchorage.

Chavez, R., and C. A. Shelden. 2014. Inseason subsistence salmon harvest monitoring, Lower Kuskokwim River, 2013. Alaska Department of Fish and Game, Fishery Management Report No. 14-36, Anchorage.

Coffing, M. W. 1991. Kwethluk subsistence: contemporary land use patterns, wild resource harvest and use, and the subsistence economy of a lower Kuskokwim River area community, Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 157. Juneau.

Conitz, J. M., K.G. Howard, and M. J. Evenson. 2012. Escapement goal recommendations for select Arctic-Yukon-Kuskokwim Region salmon stocks, 2013. Alaska Department of Fish and Game, Fishery Manuscript No. 12-07, Anchorage.

Elison, T. B., K .L. Schaberg, and D. J. Bergstrom. 2012. Kuskokwim River salmon stock status and Kuskokwim area fisheries, 2012; a report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Special Publication No. 12-27, Anchorage.

Estensen, J. L., D. B. Molyneaux, and D. J. Bergstrom. 2009. Kuskokwim River salmon stock status and Kuskokwim area fisheries, 2009: a Report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Special Publication No. 09-21, Anchorage.

Francisco, K. R., K. Schultz, D. J. Schneiderhan, D. Huttunen, C. Burkey Jr., H. Hamner, R. Walker. 1989. Annual management report Kuskokwim Area, 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3B89-08, Anchorage.

Hamazaki, T., M. J. Evenson, S. J. Fleischman, and K. L. Schaberg. 2012. Escapement goal recommendation for Chinook salmon in the Kuskokwim River drainage. Alaska Department of Fish and Game, Fishery Manuscript Series No. 12-08, Anchorage.

Hansen, T. R., and B. J. Blain. 2014. Salmon escapement monitoring in the Kuskokwim River, 2013. Alaska Department of Fish and Game, Fishery Data Series No. 14-54, Anchorage.

REFERENCES CITED (Continued)

Huttunen, D. C. 1984. 1982-1983 Kuskokwim River test fishing projects. AYK Region, Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim River Salmon Test Fishing Report No. 13, Juneau.

Kuskokwim Fishermen's Cooperative. 1991. Kuskokwim River salmon management working group, subsistence survey final report, 1990. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3B91-01, Anchorage.

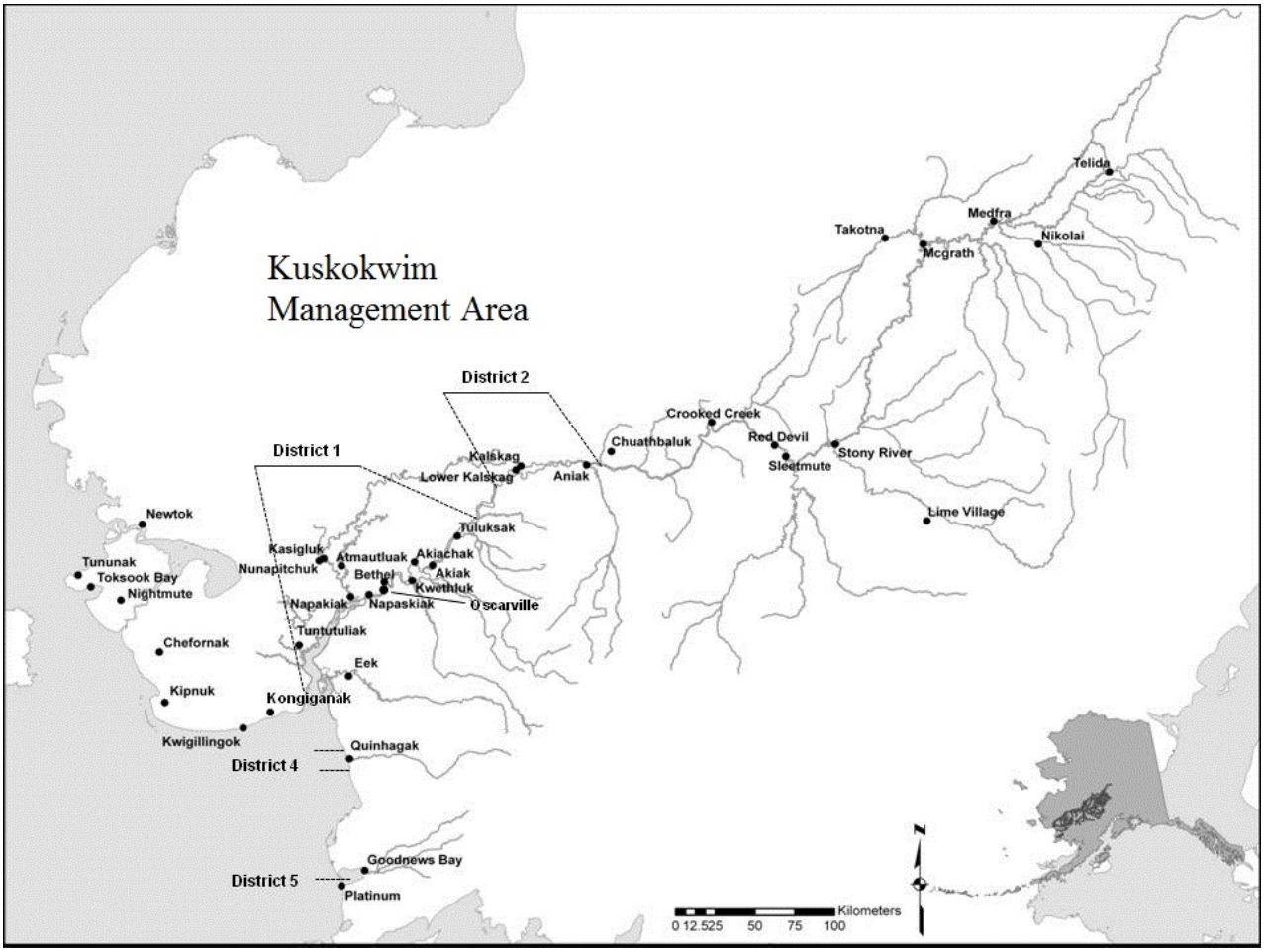
Linderman, J. C. Jr., and D. J. Bergstrom. 2006. Kuskokwim River Chinook and chum salmon stock status and Kuskokwim area fisheries; a report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Special Publication No. 06-35, Anchorage.

Peeks, J., and C. A. Shelden. 2015. Activities of the Kuskokwim River salmon management working group, 2014. Alaska Department of Fish and Game, Fishery Management Report No. 15-33, Anchorage.

Shelden, C. A., T. Hamazaki, M. Horne-Brine, G. Roczicka, M. J. Thalhauser, H. Carroll. 2014. Subsistence salmon harvests in the Kuskokwim area, 2011 and 2012. Alaska Department of Fish and Game, Fishery Data Series No. 14-20, Anchorage.

Whitmore, C., M. Martz, D. G. Bue, J. C. Linderman and R. L. Fisher. 2005. Annual management report for the subsistence and commercial fisheries of the Kuskokwim Area, 2003. Alaska Department of Fish and Game, Fishery Management Report No. 05-72, Anchorage.

APPENDIX A



Appendix A1.–The Kuskokwim Management Area, including Kuskokwim Bay, the Kuskokwim River, and all commercial fishing districts.

Appendix A2.–Historical events. Kuskokwim management area, 1913–2014.

Year	Event
1913	Commercial sale of salmon export first documented in the Kuskokwim Area.
1954	Commercial Chinook salmon quota established.
1959	First Chinook landing since quota established.
1960	Kanektok counting tower (1960–1962)
	Quinhagak District (W-4) commercial salmon fishery established.
	Kuskokwim Area divided into 4 subdistricts: Lower Kuskokwim River (Subdistrict 1), Middle Kuskokwim River (Subdistrict 2), Upper Kuskokwim River (Subdistrict 3), Quinhagak (Subdistrict 4). District boundaries are not well recorded; in the Aniak area, some commonly used drift sites overlap between District 2 and 3, which confused catch reporting.
	Kuskokwim River drainage aerial surveys are initiated, 1960.
1961	ADF&G Kuskokwim River tagging study on Chinook, Sockeye, Coho, Chum, and Pink salmon.
1962	ADF&G Kuskokwim River tagging study on Chinook, Sockeye, Coho, Chum, and Pink salmon.
	Boundary between Subdistricts 2 and 3 changed; the new location was not recorded but the most likely location was Kolmakof River. The reason for the change was to move the boundary to a point which was between commonly used gillnet locations and thereby avoid confusion in catch reporting. As a result, there were no landings in Subdistrict 3.
1963	ADF&G Kuskokwim River tagging study.
	Boundaries of subdistrict documented; Subdistrict 1 extended from Kuskokuak to Mishevik Slough, Subdistrict 2 was from Mishevik Slough to Kolmakof River, and Subdistrict 3 was upstream of Kolmakof River.
1965	Kwegooyuk test fishery (1965–1984; no records available for 1965).
1966	ADF&G Kuskokwim River tagging study Chinook, sockeye, and chum salmon.
	Subdistrict 3 was removed from the regulations due to a lack of landings.
1968	Goodnews Bay District (W-5) commercial salmon fishery established.
1969	District 4 tagging study (1969–1970) on Chinook and chum salmon.
	Kogrukluk River (a.k.a. Holitna River, Ignatti) tower/weir (1969–present).
1970	Effect of explosive detonation in ice on northern pike.
1971	Commercial fishing time in the Kuskokwim River reduced from two 24-hour periods per week to two 12-hour periods per week.
	Chum salmon fishery begins in the Kuskokwim River; season was from 25 June to 31 July, location limited to waters downstream of Napakiak, mesh size restricted to 6 in or smaller.
	Fishing periods established by Emergency Order in August.
	Gillnet mesh size in Districts 4 and 5 restricted to 6 in or smaller.
1974	Commercial sale of salmon roe from subsistence caught fish (1974–1977).

-continued-

Year	Event
1976	Commercial fishing time in the Kuskokwim River was reduced from two 12-hour periods per week to two 6-hour periods per week.
	Eek River reconnaissance survey.
	Study on genetic variants in chum and Chinook salmon.
1977	Fishing periods to be established by Emergency Order before 26 June and after 31 July.
	Limited entry permits issued.
	Subsistence fishing closed 24 hours before, during, and 6 hours after each commercial fishing period.
	Hoholitna River reconnaissance survey.
1978	Kasigluk River reconnaissance survey.
	Kwethluk River sonar project.
1979	The portion of District 1 used during the chum salmon season was extended from Napakiak upstream to Bethel.
	Kasigluk River sonar project.
	High seas salmon fleet moved from west of 160° W longitude to west of 180° W longitude.
1980	Subsistence fishing closed 24 hours before, during, and 6 hours after each commercial fishing period.
	Aniak River sonar project initiated.
1981	Pilot test fish and FanScan sonar projects at Bethel.
	Inventory of Kisaralik River and Lake.
	Goodnews River counting tower (1981–1990).
	Salmon River (Pitka Fork drainage) weir project (1981–1984).
	Species identification program results in better differentiation of sockeye and chum salmon.
1982	Kanektok River sonar project (1982–1986).
1983	Pilot test fish project at Bethel using drift gillnets.
	Provisional escapement goals established for many of the major spawning tributaries in the area.
	Management strategy shifts from guideline harvest based to obtaining escapement objective.
1984	Kwegooyuk test fishery replaced by the Bethel drift test fishery.
1985	Commercial fishing restricted to 6 inch or smaller mesh sizes.
	Chum salmon season utilizes entire length of District 1.
1986	Migratory timing of coho salmon in the Kuskokwim Area, 1979–1984.
	Kuskokwim River salmon abundance estimate based on calibrated test fish CPUE.
	Downstream boundary of District 1 extended to a line from Apokak Slough to Popokamiut.
1987	Discontinued the directed commercial Chinook salmon fishery in the Kuskokwim River.
	Sale of Chinook salmon limited to 14,000 in the Kuskokwim River June commercial fishery.

-continued-

Year	Event
1987 (cont.)	First fishing period restricted to that portion of District 1, which is downstream of Bethel, due to Chinook conservation concerns.
	Subsistence fishing in all of District 2 and its tributary streams is closed before, during, and after commercial periods.
	South Peninsula sockeye and chum salmon tagging study.
1988	Review of the estimation of Kuskokwim River annual salmon passage through expansion of the Bethel test fish CPUE.
	Kuskokwim River sonar project (1988–1995).
	Kuskokwim River subsistence test fisheries (1988–1990).
	District 1 upstream boundary extended to Bogus Creek.
	District 2 reduced in size; downstream boundary moved upstream to High Bluffs and upstream boundary moved downstream to Chuathbaluk.
	Portion of Kuskokwim River between Districts 1 and 2 closed to subsistence fishing when District 1 subsistence fishing is closed.
	Reorganization of District 1 Statistical Areas.
	District 4 Salmon Management Plan adopted.
	Establishment of the Kuskokwim River Salmon Management Working Group (1988–present).
	Eek Test Fishery (1988–1990, 1992–1995).
1989	USFWS conducted genetic sampling throughout the Kuskokwim Area.
	USFWS conducted Chinook tagging study in the lower Kuskokwim River.
	Record low temperatures recorded in interior Alaska coupled with shallow snowpack threaten survival of salmon eggs/fry from 1988 spawning.
1990	ADF&G genetic sampling (1990–1996).
	Reorganization of District 1 statistical areas.
	Upstream boundary of District 1 moved downstream from Bogus Creek to Big (Nelson) Island.
	Downstream boundary of District 2 moved upstream to second slough below Kalskag.
	District 4 northern boundary is extended north to Weelung Creek.
1991	USFWS operates Tuluksak River weir (1991–1994).
	Weir replaces counting tower on Goodnews River (1991–present).
1992	Aniak and Chuathbaluk test fisheries (1992–1995).
	Eek test fishery is reestablished for the coho season.
	USFWS operates Kwethluk River weir (1992).
	Ban on high-seas drift gillnet fishing imposed.
	Unusual proportion of returning 5-year-old chum salmon had reduced growth between the second third annuli.

-continued-

Year	Event
1992 (cont.)	Failure of age-4 chum salmon in the Kuskokwim River; Aniak River drainage especially hard hit; attributed to cold winter of 1988–1989.
1993	Failure of age-4 and age-5 chum salmon in the Kuskokwim River, Yukon River, and the Norton Sound/Kotzebue Area; cause unknown; especially hard hit were the Aniak River drainage and the Yukon River fall chum salmon; commercial fishing severely restricted, chum salmon sport fishery was closed, and the subsistence salmon fishery was restricted and closed for a period of time (first time ever).
	The BOF made a positive finding for customary and traditional use for all salmon in the entire Kuskokwim Area.
1994	Working Group commissioned and Dr. Mundy started "Recommendations for Strengthening the Cooperative Management Process of the Kuskokwim River Salmon Management Working Group."
	Upstream boundary of District 1 moved upstream to Bogus Creek.
1995	BSFA operates a chum salmon radiotelemetry project on the Kuskokwim River.
	Takotna Community School and ADF&G operate a salmon counting tower on the Takotna River (1995–1998).
	AVCP and BSFA operate the Lower Kuskokwim test fishery in cooperation with ADF&G; the project is a modification of the Eek test fishery.
1996	ADF&G genetic sampling for late spawning chum salmon and one mixed-stock sample from District 1.
	Near record low water levels during June and early August coupled with record high water temperatures.
	Irregular fishing schedule in District 1 during June and July due to limited market interest for chum salmon.
	Record early coho run coupled with record high harvest and escapement at Kogrukluk River.
	AVCP and ADF&G operate a salmon counting tower on the Kwethluk River (1996–1999).
	KNA and ADF&G operate a salmon weir on the George River (1996–present).
	Aniak River sonar is relocated to allow for full channel ensonification and configurable sonar technology is employed (1996–2011).
	Native Village of Kwinhagak (NVK) begins development of a salmon counting tower on the Kanektok River.
1997	Kuskokwim River declared an economic disaster area due to very low chum and coho salmon returns, harvests and exvessel value. Northern boundary of District 4 moved 3 miles south from July 14 to July 28. Record low chum salmon escapement at Kogrukluk River weir.
	Second summer of record low water levels in the Kuskokwim River basin during the summer and fall coupled with record high water temperatures.
	Anomalous Bering Sea conditions: warm water, odd plankton blooms, sea bird die-offs, etc.
	Aniak chum salmon return vastly exceeded expectations based on 1992–1993 spawning abundance estimates.
	Due to an extremely low return of chum salmon, ADF&G, AVCP, KNA, KRSMWG, ONC, TCC, and McGrath Native Village Council issue a joint appeal for subsistence users to conserve chum salmon. Record low subsistence harvest of chum salmon in the Kuskokwim Area.

-continued-

Year	Event
1997 (cont.)	Sale of salmon roe is prohibited in Districts 1 and 2 (effective beginning December 1997).
	Middle Fork Goodnews River weir converted from fixed-panel to a resistance board "floating weir" and operated through majority of coho run for first time (1997-2013).
	NVK and ADF&G operate a salmon counting tower on the Kanektok River (1997–1998).
1998	Kuskokwim River declared an economic disaster area for second straight year due to low chum and coho salmon returns, harvests, and exvessel value.
	KNA and ADF&G operate a salmon weir on the Tatlawiksuk River (1998–present).
	Second year of anomalous Bering Sea conditions: warm water, odd plankton blooms, sea bird die-offs, etc.
	High water levels severely restrict operational period of many Kuskokwim Area escapement projects.
	Record low average water temperature measured at the Bethel test fish site.
1999	Kuskokwim River experiences extremely low returns, harvests, and exvessel value of Chinook, chum, and coho salmon for third consecutive year. All species have very late run timing. Kuskokwim Bay coho returns and harvests extremely low.
	Federal government assumes regulatory authority of subsistence fishery management in federal waters on October 1.
	KNA-operated salmon weirs on the Tatlawiksuk and George rivers converted to resistance board (floating) weirs and operations extended through coho salmon run.
	Kuskokwim River sonar project begins redevelopment using split-beam sonar and is relocated to a new site one mile above upstream end of Church Slough.
2000	Kuskokwim River declared an economic disaster area due to extremely low chum salmon return, harvest, and exvessel value. Chinook salmon returns are very low for second consecutive year. Many subsistence fishermen report that they were unable to meet their Chinook and chum salmon harvest goals.
	Due to an extremely low return of Chinook salmon, ADF&G, AVCP, KNA, KRSMWG, Kwethluk IRA, TCC, McGrath Native Village Council, and USFWS issue a joint appeal for subsistence users to conserve Chinook salmon.
	ADF&G and Federal Office of Subsistence Management (FOSM) restrict subsistence Chinook salmon fishery.
	Takotna Community Schools and ADF&G operate a resistance board weir on the Takotna River (2000-2012).
	Kwethluk IRA and USFWS operate a resistance board weir on the Kwethluk River (2000 to present).
	District W-1 divided into Subdistricts W-1A (above Bethel) and W-1B (below Bethel) and fishermen are required to register to fish in only one subdistrict. Due to limited processing capacity, only one subdistrict is opened at a time to reduce harvest.
	Commercial fishermen required to identify vessels with either ADF&G or CFEC permit number.

-continued-

Year	Event
2000 (cont.)	ADF&G Division of Sport Fish creates Lower Yukon–Kuskokwim Management Area and stations Area Management Biologist in Bethel.
	Line attached to a pole (rod and reel) added to legal gear for subsistence fishing in AVCP region (prior to 2000 fishing season).
	Use of rod and reel for subsistence extended throughout the Kuskokwim Area (2000–2001 BOF meeting).
2001	Alaska Board of Fisheries designates Kuskokwim River Chinook and chum salmon to be stocks of yield concern based on the Sustainable Fisheries Policy because of poor runs since 1997.
	Subsistence fishing schedule implemented in the Kuskokwim River during June and July to conserve Chinook and chum salmon and provide for adequate fishing opportunity throughout the drainage.
	Kuskokwim River declared an economic disaster area due to low chum salmon return, harvest and exvessel value. No commercial fishing periods in Kuskokwim River in June and July. Chinook salmon returns are below average in size.
	Due to an extremely low return of Chinook salmon, ADF&G, AVCP, KNA, KRSMWG, Kwethluk IRA, McGrath Native Village Council, ONC, and USFWS issue a joint appeal for subsistence users to conserve Chinook and chum salmon.
	Native Community of Tuluksak and USFWS operate a resistance board weir on the Tuluksak River.
	NVK and ADF&G operate a salmon counting weir on the Kanektok River.
	ADF&G/CF and KNA operate fish wheels at Kalskag and Birch Tree Crossing to tag salmon and then make salmon population estimates.
2002	The State of Alaska declared the Kuskokwim region a disaster area for the fifth year in six because of low salmon prices in the bay and river and a complete lack of buyers during the chum season on the river.
	ADF&G did not join USFWS and Native groups in issuing a preseason appeal for subsistence users to conserve Chinook and chum salmon because such a request is allocative in nature and only the BOF makes allocation decisions.
	In June the Federal Subsistence Board adopted a special regulatory action that tied the time allowed for sport fishing to the time allowed for subsistence net and fish wheel fishing in federal waters in the Kuskokwim River drainage. Upon a request for reconsideration by ADF&G, the Federal Subsistence Board rescinded its decision. The reason for the rescission was that under ANILCA, sport fishing on federal waters is managed by ADF&G unless there are overriding conservation or subsistence concerns. In this instance there were no overriding conservation or subsistence concerns.
	A subsistence fishing schedule was implemented in the Kuskokwim River during June to conserve Chinook and chum salmon and to provide adequate subsistence fishing opportunity throughout the drainage. However, because an average Chinook run and an above-average chum run developed, the subsistence schedule was lifted on June 28.
	The Kuskokwim River Fisheries Co-op dissolved. ACR #28 was accepted by BOF so that the formation of a Chignik-style salmon fishing cooperative on the Kuskokwim River could be considered.

-continued-

Year	Event
2002 (cont.)	ADF&G/SF and KNA operated salmon radiotelemetry projects on the Kuskokwim mainstem and on the Holitna River to estimate Chinook salmon abundance.
	Second consecutive season of no chum salmon (June or July) directed commercial fishery.
2003	A subsistence fishing schedule was implemented in the Kuskokwim River during June to conserve Chinook and chum salmon and to provide adequate subsistence fishing opportunity throughout the drainage. However, because an average Chinook and chum salmon run developed, the subsistence schedule was lifted on July 3.
	Third consecutive season of no chum salmon (June or July) directed commercial fishery.
	ADF&G/SF and KNA operated salmon radiotelemetry projects on the Kuskokwim mainstem and on the Holitna River to estimate Chinook salmon abundance.
	Record high coho salmon escapements throughout the Kuskokwim Area.
2004	The Alaska Board of Fisheries continued the stock of yield concern designation for Kuskokwim River Chinook and chum salmon based on the Sustainable Salmon Fisheries Policy. Chinook and chum salmon returns have been improving since 2000; however, a majority of annual returns in the previous 5 years did not have adequate harvestable surpluses beyond escapement and subsistence needs.
	The Alaska Board of Fisheries provided a commercial guideline harvest level of 0–50,000 sockeye salmon for the Kuskokwim River.
	The Alaska Board of Fisheries readopted regulations 1) to increase subsistence fishing opportunity prior to and after commercial salmon fishing periods, 2) to provide opportunity for subsistence salmon fishing to occur in a portion of the District 1 subdistrict not open to commercial fishing, and 3) to modify Kuskokwok Slough subsistence fishing regulations to be consistent with District 1 waters.
	The northern boundary of District W-4 (Quinhagak) was relocated approximately one mile north from Oyak Creek to the northernmost edge of the mouth of Weelung Creek.
	The western boundary of District W-5 (Goodnews Bay) was relocated seaward from a line between the northern and southern most points of the North and South spits at the entrance to Goodnews Bay to a line extending from approximately 2 miles South on the seaward entrance of Goodnews Bay to approximately 2 miles North on the seaward entrance to Goodnews Bay.
	Regulations for Districts 4 and 5 were amended to provide emergency order authority to increase gillnet length to 100 fathoms provided run strength was adequate.
	The Goodnews Bay District herring super exclusive use regulations were repealed.
	Evaluation of AYK Region escapement goals and methodology resulted in revisions of the majority of existing Kuskokwim Area escapement goals to Sustainable Escapement Goal ranges using the Bue-Hasbrouck method.
	A subsistence fishing schedule was implemented in the Kuskokwim River during June to conserve Chinook and chum salmon and to provide adequate subsistence fishing opportunity throughout the drainage. However, because an above average Chinook salmon run and an average to above-average chum salmon run developed, the subsistence schedule was lifted on June 18.
	A limited chum and sockeye directed commercial fishery was prosecuted in late June and early July for the first time since 2000. Participation and processor capacity was limited compared to previous years.

-continued-

Year	Event
2004 (cont.)	Water levels in rivers throughout the Kuskokwim Area were well below average from mid-July through September. Kuskokwim River water level attained a 50-year low during August as measured at the USGS gauging station at Crooked Creek.
2005	Chum escapements were at record highs at nearly all monitoring projects with the exception of George River where escapement was near average.
	Chinook escapements ranged from above average to record highs at nearly all monitored locations with the exception of George River where the escapement was near average.
	Commercial salmon fishing opportunity in District 1 reduced in July because of poor chum salmon market conditions.
	Commercial salmon fishing opportunity in the Kuskokwim Bay districts was reduced during July because of limited processing capacity, and in August because of below-average coho salmon abundance.
2006	Commercial salmon fishing opportunity in District 1 reduced in July because of poor chum salmon market conditions.
	Chum salmon escapements were at record highs at the Kwethluk, George, and Takotna river monitoring projects.
	During 4 commercial periods in early July limits were imposed on the number of fish that could be delivered by District 4 and 5 fishermen because of limited capacity to process an above average catch.
2007	The Alaska Board of Fisheries (BOF) discontinued the stock of concern designation for Kuskokwim River Chinook and chum salmon based on at or above the historical average runs each year since 2002.
	The BOF passed a proposal giving ADF&G authority to allow up to 8 in mesh gillnets in District 1 by emergency order; otherwise, all commercial openings will continue to be limited to gillnet mesh sizes of 6 in or less. The BOF's intent in allowing for up to 8 in mesh gear was not to establish a large mesh gear Chinook salmon commercial fishery, but to provide a management tool that may or may not be used. Additionally, the commercial Chinook salmon fishery closure was discontinued, and the commercial salmon fishery is to be managed based on run strength and harvestable surpluses of Chinook, sockeye, and chum salmon.
	The BOF passed a proposal giving ADF&G authority to allow the lower portion of Subdistrict 1-B to open to commercial fishing up to 2 hours earlier than the remainder of Subdistrict 1-B.
	A lack of processing capacity, commercial interest, and continued poor chum salmon market conditions resulted in no commercial openings in June and July.
	From late June through mid-July, limits on the number of fish that could be delivered by District 4 and 5 fishermen were imposed because of limited processing capacity.
2008	Commercial salmon fishing opportunity in District 1 reduced in July because of poor chum salmon market conditions.
	From late June through mid-July, limits on the number of fish that could be delivered by District 4 and 5 fishermen were imposed because of limited processing capacity.

-continued-

Year	Event
2010	Kuskokwim River Chinook salmon spawning escapements were among the lowest on record and only the Kogrukluk achieved the lower end of the escapement goal.
	Kwethluk, and Tuluksak rivers were closed to subsistence and sport harvest of Chinook salmon for most of the season by the USFWS.
	Kuskokwim River chum salmon catch was the largest since 1998.
	Kuskokwim River sockeye salmon run timing was the latest on record for the Bethel test fishery with 2 distinct pulses and an average commercial harvest.
	Telaquana Lake weir passed over 70,000 sockeye salmon.
	High water levels were sustained through most of August on the Kuskokwim River.
	Coho salmon fishery closed on August 12 due to low abundance and the commercial catch was the lowest since 1999.
	District W-4 highest exvessel value since 1988, primarily attributed to record sockeye salmon harvest.
	District W-5 had its highest exvessel value since 1994.
2011	Kuskokwim River Chinook salmon spawning escapements continued to be below average and only Kogrukluk met the escapement goal.
	Preseason management actions were taken in an effort to achieve escapement goals including:
	Subsistence Chinook salmon fishing with hook and line gear was closed and subsistence fishing was restricted to the use of gillnets with 4 in or less mesh not to exceed 60 ft in the Tuluksak, Kisaralik, Kasigluk, and Kwethluk rivers including Kuksokuak Slough.
	Subsistence fishing was closed in District 1 from June 16 to June 19 and June 23 to June 28.
	Subsistence fishing was restricted to 6 in or smaller mesh from June 29 to July 7.
	Federal Special Actions in 3-KS-01-11 and 3-KS-02-11 preempted state management emergency orders from June 30 to July 2, 2011.
	Kuskokwim River chum salmon catch was the largest since 1998.
2012	Kuskokwim River Chinook salmon run was smallest on record resulting in 12 days of subsistence salmon fishing closures, additional Chinook salmon subsistence fishing restrictions, and the lowest Chinook salmon subsistence harvest on record.
	High water plagued escapement projects throughout the season and Chinook salmon escapement goals that were assessed were not achieved.
	Kuskokwim River declared an economic disaster due to low exvessel value and very small Chinook salmon subsistence harvest.
	District 4 and Kanektok River had the lowest catch and escapement of Chinook salmon on record.
	District 5 had highest sockeye salmon catch since 1994.
2013	In January of 2013, the Alaska Board of Fisheries adopted a new Kuskokwim River Salmon Management Plan (5 AAC 07.365), and a new drainagewide SEG of 65,000–120,000 Chinook salmon was established. Within the management plan it states that ADFG& shall use inseason run projections and test fishing indices to asses run abundance. This information would be evaluated inseason using the Bethel test fishery (BTF) catch per unit effort (CPUE) and subsistence harvest reports.

-continued-

Year	Event
(2013 cont.)	ANS ranges were adjusted at the January 2013 BOF meeting: 67,200–109,800 Chinook salmon in the Kuskokwim River drainage; 41,200–116,400 chum salmon in the Kuskokwim River drainage; 32,200–58,700 sockeye salmon in the Kuskokwim River drainage; 27,400–57,600 coho salmon in the Kuskokwim River drainage; 500–2,000 pink salmon in the Kuskokwim River drainage; 6,900–17,000 salmon in Districts 4 and 5 combined; 12,500–14,400 salmon for the remainder of the Kuskokwim Area.
	Kuskokwim River Chinook salmon run was the smallest on record. This resulted in 17 days of restrictions on the mainstem Kuskokwim River.
	The tributaries of Kwethluk, Kasigluk, Kisarolik, Tuluksak, and Aniak rivers were restricted to the use of gillnets with 4 in or less mesh size and 60 ft in length from June 1 to July 25.
	Chinook salmon escapements at tributary weirs were the lowest on record with escapements at the George and Kogrugluk river weirs being below their respective SEG range.
	The BOF removed the regulation allowing up to 8 in mesh size gillnets to be used in the Kuskokwim River commercial fishery by emergency order. This regulatory option had not been used and now only gillnets of 6 in or smaller mesh size may be used in the commercial fishery.
2014	In March 2014 two emergency petitions to BOF were submitted and adopted into regulation.
	An emergency petition to add dip nets as legal gear for the taking of salmon other than Chinook salmon during times of Chinook salmon conservation was submitted. The board found that this petition met the criteria for the finding of an emergency and adopted it as an emergency regulation. This allows the department to open subsistence fishing periods with dip net gear and all Chinook salmon caught must be returned immediately to the water alive. This will be used to provide more opportunity to harvest chum and sockeye salmon while conserving Chinook salmon.
	An emergency petition to provide the department the ability to restrict the length of subsistence gillnets from 50 fathoms to 25 fathoms (150 feet) during times of king salmon conservation was submitted. The board found that this petition met the criteria for the finding of an emergency and adopted it as an emergency regulation. This gives the department more flexibility to open subsistence fishing periods during times of Chinook salmon conservation. Gillnets may be over 25 fathoms in total length, but must be tied and/or bagged in such a way that only 25 fathoms can be used to fish
	Kuskokwim river Chinook salmon run was below average and resulted in 31 days of restrictions on the mainstem Kuskokwim River.
	The tributaries of Kwethluk, Kasigluk, Kisarolik, Tuluksak, and Aniak rivers were closed to subsistence harvest of Chinook salmon with gillnets.
	Kuskokwim River coho salmon runs were strong and escapements were some of the largest recorded.

Appendix A3.–Commercial salmon harvest, excluding personal use, Kuskokwim Area, 1960–2014.

	Commercial harvest					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960[a]	5,969	5,649	5,498	0	0	17,116
1961[a]	23,246	2,308	5,090	90	18,864	49,598
1962[a]	20,867	10,313	12,432	4,340	45,707	93,659
1963[a]	18,571	0	15,660	0	0	34,231
1964[a]	21,230	13,422	28,992	939	707	65,290
1965[a]	24,965	1,886	12,191	0	4,242	43,284
1966	25,823	1,030	22,985	268	2,610	52,716
1967	29,986	652	58,239	0	8,235	97,112
1968	43,157	5,884	154,275	75,818	19,684	298,818
1969	64,777	10,362	110,473	1,251	50,377	237,240
1970	64,722	12,654	62,245	27,422	60,566	227,609
1971	44,936	6,054	10,006	13	99,423	160,432
1972	55,598	4,312	23,880	1,952	97,197	182,939
1973	51,374	5,224	152,408	634	184,207	393,847
1974	30,670	29,003	179,588	60,099	196,127	495,487
1975	28,219	17,705	110,576	915	225,308	382,723
1976	49,262	14,636	112,130	39,998	231,877	447,903
1977	58,256	18,621	263,727	434	298,959	639,997
1978	63,194	13,734	247,271	61,968	282,044	668,211
1979	53,314	39,463	308,683	574	297,167	699,201
1980	48,599	42,213	327,878	30,306	560,943	1,009,939
1981	79,377	105,940	278,551	463	485,653	949,984
1982	79,816	97,716	567,452	18,259	326,481	1,089,724
1983	93,676	90,834	248,389	379	306,554	739,832
1984	74,017	81,304	826,774	23,902	488,480	1,494,477
1985	74,083	121,221	382,096	111	224,680	802,191
1986	44,972	142,029	736,910	16,561	349,269	1,289,741
1987	65,558	170,849	478,594	163	603,274	1,318,438
1988	74,563	149,949	623,733	37,645	1,443,953	2,329,843
1989	67,003	82,628	556,312	819	802,199	1,508,961
1990	84,449	203,918	443,783	16,082	520,885	1,269,117
1991	48,170	202,441	556,818	522	502,187	1,310,138
1992	67,597	192,341	772,449	85,978	436,506	1,554,871
1993	26,636	167,235	686,570	71	94,937	975,449
1994	27,345	191,169	856,100	84,870	360,893	1,520,377
1995	72,352	198,045	555,539	318	707,212	1,533,466
1996	22,959	122,260	1,099,853	1,663	301,975	1,548,710
1997	47,990	123,002	166,648	7	67,200	404,847
1998	44,192	129,449	311,910	2,720	267,059	755,330
1999	25,019	81,201	32,251	2	72,659	211,132
2000	26,115	109,939	307,439	17	49,573	493,083
2001	14,384	59,545	220,804	0	21,893	316,626

-continued-

Appendix A3.–Page 2 of 2.

Year	Commercial harvest					
	Chinook	Sockeye	Coho	Pink	Chum	Total
2002	12,531	24,190	113,199	0	34,951	184,871
2003	16,014	63,646	346,555	0	36,225	462,440
2004	30,332	63,682	541,894	0	51,935	687,843
2005	31,014	120,379	205,762	19	85,236	442,410
2006	24,860	148,784	224,905	1	94,981	493,531
2007	22,878	153,812	189,456	6	79,864	446,016
2008	23,958	112,581	259,681	15	98,239	494,474
2009	22,093	170,370	161,073	18	185,099	538,653
2010	18,721	201,869	76,621	7	227,441	524,659
2011	18,226	76,613	119,938	2	236,466	451,245
2012	8,576	91,192	143,123	0	150,822	393,713
2013	2,723	51,682	156,777	1	122,966	334,149
2014	2,470	82,114	222,063	3	37,046	343,696
Average 2004–2013	20,338	119,096	207,923	7	133,305	480,669

[a] Includes harvests from District 3.

Appendix A4.–Estimated exvessel value of the commercial salmon harvest and permits fished, Kuskokwim Management Area, 1987–2014.

	District 1		District 2		District 4		District 5			
Year	Value of catch	Permits fished [a]	Value of catch	Permits fished [a]	Value of catch	Permits fished [a]	Value of catch	Permits fished [a]	Total value	Total permits
1987	$4,893,016	705	$139,049	29	$858,818	310	$572,293	116	$6,463,176	800
1988	$10,060,427	745	$246,069	29	$1,381,661	289	$1,038,041	125	$12,480,129	813
1989	$3,883,321	743	$131,168	30	$746,071	227	$378,962	88	$5,008,354	824
1990	$3,385,636	742	$121,329	22	$1,013,472	390	$361,203	82	$4,760,311	823
1991	$2,971,767	749	$111,651	23	$592,436	346	$273,795	72	$3,837,998	819
1992	$3,764,804	741	$147,992	22	$993,664	349	$439,331	111	$5,197,799	814
1993	$2,533,895	737	$90,906	20	$898,255	408	$440,955	114	$3,873,105	804
1994	$3,559,114	706	$129,555	17	$837,157	307	$591,903	116	$4,988,174	793
1995	$2,776,677	712	$107,913	21	$1,047,188	382	$287,599	87	$4,111,464	798
1996	$2,108,418	620	$11,015	8	$534,726	218	$222,388	54	$2,865,532	714
1997	$430,614	604	$2,944	4	$497,071	289	$121,973	53	$1,049,658	702
1998	$982,791	615	$617	3	$467,843	203	$184,060	50	$1,634,694	707
1999	$170,278	509	$0	0	$279,092	218	$102,803	73	$552,173	604
2000	$509,594	532	$3,039	4	$466,560	230	$212,336	46	$1,188,490	623
2001	$429,534	412	$0	0	$228,615	159	$98,458	32	$756,607	514
2002	$127,208	318	$0	0	$167,748	114	$28,703	30	$323,659	407
2003	$453,187	359	$0	0	$304,553	114	$135,287	34	$893,027	438
2004	$943,767	390	$0	0	$405,344	116	$135,246	29	$1,484,357	467
2005	$448,853	403	$0	0	$571,965	145	$134,295	29	$1,155,113	484
2006	$451,390	373	$0	0	$551,182	132	$141,235	24	$1,143,807	453
2007	$380,842	366	$0	0	$660,865	125	$223,329	28	$1,265,036	456
2008	$538,310	374	$0	0	$750,731	146	$198,070	25	$1,487,111	462
2009	$502,848	342	$0	0	$747,325	179	$192,031	39	$1,442,204	434
2010	$765,606	433	$0	0	$1,655,321	241	$473,661	48	$2,894,588	530
2011	$764,358	413	$0	0	$1,176,435	219	$346,022	48	$2,286,815	510
2012	$597,998	379	$0	0	$824,435	179	$617,766	58	$2,040,199	477
2013	$1,184,847	378	$0	0	$761,537	197	$452,651	71	$2,399,035	469
2014	$843,356	358	$0	0	$858,639	194	$584,655	61	$2,286,649	457
Avg 2004–2013	$657,882	385	$0	0	$810,514	168	$291,431	40	$1,759,827	474

[a] Number of permits that made at least one delivery.

Appendix A5.–Commercial salmon average weights and prices paid Kuskokwim Area, 1967–2014.

	Average weight (lb)					Average price ($)				
Year	Chinook	Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum
1967	27.8	7.4	5.9	[a]	7.0	0.13	0.05	0.09	[a]	0.04
1968	23.8	6.2	7.2	4.0	7.9	0.16	0.10	0.09	0.05	0.04
1969	19.6	6.2	7.3	3.6	5.8	0.19	0.15	0.10	0.06	0.07
1970	18.9	5.4	7.3	3.3	6.1	0.20	0.21	0.14	0.08	0.08
1971 [b]	26.2	6.9	6.1	[a]	6.4	0.17	0.10	0.13	[a]	0.08
1972	24.7	[a]	6.4	[a]	6.5	0.20	[a]	0.16	[a]	0.08
1973	26.7	[a]	5.8	[a]	6.8	0.25	[a]	0.26	[a]	0.19
1974	17.1	6.3	7.5	4.1	6.8	0.46	0.34	0.27	0.23	0.25
1975	14.9	[a]	8.2	[a]	6.4	0.54	[a]	0.31	[a]	0.26
1976 [c]	17.0	6.7	7.8	3.5	7.0	0.64	0.43	0.40	0.25	0.27
1977	22.7	8.3	7.8	3.9	7.3	1.15	0.45	0.65	0.25	0.45
1978	24.2	6.5	7.1	3.9	8.9	0.50	0.49	0.40	0.12	0.32
1979	16.6	6.9	7.9	3.9	7.0	0.66	0.53	0.75	0.11	0.37
1980	14.1	6.7	6.9	3.6	6.4	0.47	0.31	0.64	0.12	0.24
1981	17.8	7.2	6.4	3.5	7.5	0.84	0.61	0.63	0.11	0.23
1982	19.3	7.2	7.3	3.6	7.3	0.82	0.41	0.53	0.05	0.22
1983	18.8	6.8	6.8	3.5	7.4	0.54	0.51	0.39	0.05	0.33
1984	16.4	6.6	7.7	3.2	6.7	0.89	0.52	0.55	0.07	0.28
1985	17.0	7.0	7.5	3.6	7.1	0.71	0.59	0.51	0.05	0.25
1986	17.0	7.2	6.4	3.4	6.8	0.80	0.70	0.60	0.05	0.25
1987	15.2	7.5	7.2	3.7	6.8	1.10	1.30	0.73	0.10	0.27
1988	14.1	7.3	7.2	3.4	6.9	1.30	1.42	1.25	0.15	0.40
1989	16.6	7.2	7.3	3.4	6.8	0.75	1.20	0.55	0.05	0.26
1990	15.1	6.7	6.5	3.2	6.9	0.56	1.05	0.62	0.12	0.26
1991	15.3	6.9	6.5	3.4	6.3	0.56	0.67	0.45	0.12	0.31
1992	13.4	7.0	7.3	3.9	6.8	0.66	0.90	0.45	0.06	0.32
1993	14.3	7.1	6.6	3.4	6.5	0.62	0.70	0.58	0.25	0.40
1994	15.6	6.9	7.6	3.6	6.6	0.51	0.53	0.57	0.08	0.21
1995	17.3	6.9	7.2	3.7	6.9	0.60	0.71	0.41	0.12	0.18
1996	15.7	7.2	8.0	3.8	7.2	0.26	0.40	0.25	0.12	0.11
1997	16.2	7.1	7.5	2.7	7.3	0.28	0.42	0.33	0.10	0.12
1998	14.2	6.8	7.8	3.8	6.9	0.27	0.53	0.32	0.10	0.13

-continued-

Appendix A5.–Page 2 of 2.

	Average weight (lb)					Average price ($)				
Year	Chinook	Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum
1999	15.5	6.5	6.6	3.0	7.3	0.32	0.58	0.32	0.05	0.10
2000	15.6	6.8	6.9	3.2	7.6	0.39	0.55	0.28	0.10	0.10
2001	20.0	7.6	7.7	[a]	7.5	0.36	0.35	0.28	[a]	0.10
2002	13.9	6.7	7.9	[a]	7.9	0.35	0.35	0.20	[a]	0.10
2003	13.6	7.3	6.9	[a]	8.0	0.35	0.44	0.10	[a]	0.21
2004	12.1	6.6	6.9	[a]	6.9	0.35	0.35	0.32	[a]	0.08
2005	14.5	6.7	7.4	3.7	6.7	0.59	0.55	0.27	0.05	0.05
2006	13.9	6.4	6.3	4.0	6.9	0.54	0.48	0.33	0.25	0.05
2007	14.1	6.6	7.2	[a]	6.8	0.59	0.53	0.38	[a]	0.05
2008	12.9	6.7	7.1	4.2	7.1	0.73	0.58	0.43	0.06	0.05
2009	13.1	6.5	7.6	3.5	6.9	0.71	0.56	0.35	0.00	0.15
2010	13.1	6.8	7.1	2.8	6.9	1.60	1.13	1.01	0.00	0.26
2011	12.5	6.5	7.1	4.0	6.4	0.85	0.86	0.75	0.00	0.68
2012	15.3	6.8	6.1	0.0	6.6	0.85	0.85	0.73	0.00	0.77
2013	17.1	6.4	7.6	0.0	6.8	1.00	1.00	1.00	0.00	1.00
2014	10.5	5.7	7.0	4.3	6.6	1.00	1.25	0.96	0.00	0.60
Avg 2004–2013	13.9	6.6	7.0	2.9	6.8	0.78	0.69	0.56	0.04	0.31

[a] Information unavailable.

[b] Information on price per pound was not available for District 5.

[c] Information was not available for District 4.

Appendix A6.–Salmon assessment programs, Kuskokwim Area, 2014.

Project name: Salmon management

Location: Kuskokwim Area

Duration: All year

Agencies and responsibilities: ADF&G CF and Subsistence (all aspects), OSM (monitor regulations, inseason actions), KRSMWG (make recommendations)

Primary objective(s):

- Develop a comprehensive plan for managing salmon stocks of the Kuskokwim Area.
- Define goals and objectives.
- Identify potential opportunities and concerns.
- Recommend appropriate procedures.
- Evaluate priorities.
- Provide sustained yield fishery management.

Project name: Postseason subsistence catch and effort assessment

Location: Kuskokwim Area

Duration: Postseason

Agencies and responsibilities: ADF&G CF all aspects, KNA and ONC survey crew, and OSM funding for Bethel and Aniak

Primary objective(s):

- Document and estimate the catch and associated effort of the subsistence salmon fisheries via interviews, catch calendars, mail-out questionnaires and telephone interviews.
- Household surveys in Bethel.
- Household surveys in Aniak.

Project name: Age, sex, and length (ASL) processing and reporting

Location: Kuskokwim Area

Duration: All year

Agencies and responsibilities: ADF&G CF all aspects and OSM funding

Primary objective(s):

- Scale aging, sample processing, and reporting of salmon age, sex, and length information of Chinook, sockeye, chum, and coho salmon from escapement and commercial and subsistence fisheries.

Project name: Subsistence ASL Sampling

Location: Lower Kuskokwim

Duration: June to September

Agencies and responsibilities: ADF&G CF all aspects, ONC all aspects in Bethel, and OSM funding in Bethel

Primary objective(s):

- Sample collection for age, sex, and length information from subsistence Chinook salmon harvest.
- Agency staff recruit and train subsistence fishermen to sample their own catches.

-continued-

Project name: Aerial surveys

Location: Kuskokwim area

Duration: July to August

Agencies and responsibilities: ADF&G CF all aspects

Primary objective(s):

- Index relative abundance of Chinook salmon spawning escapement in selected streams throughout the Kuskokwim Area.
- Index relative abundance of sockeye salmon spawning escapement in the Kanektok and Goodnews rivers.

Project name: Sport catch, harvest, and effort assessment.

Location: Kuskokwim area

Duration: Postseason

Agencies and responsibilities: ADF&G SF all aspects

Primary objective(s):

- Statewide mail out survey to estimate sport catch, harvest, and effort.

Project name: Commercial catch and effort assessment

Location: Districts 1, 2, 4, and 5

Duration: June to September

Agencies and responsibilities: ADF&G CF all aspects

Primary objective(s):

- Document and estimate the catch and associated effort of the commercial salmon fishery via receipts (fish tickets) of commercial sales and dock side sampling.

Project name: Commercial catch ASL sampling

Location: Districts 1, 4, and 5

Duration: June to August

Agencies and responsibilities: ADF&G CF all aspects

Primary objective(s):

- Determine age, sex, and length of salmon harvested in the commercial fisheries.

Project name: Kuskokwim River inseason subsistence harvest monitoring

Location: Lower Kuskokwim River

Duration: June to August

Agencies and responsibilities: ADF&G CF all aspects, ONC all aspects in Bethel, OSM funding

Primary objective(s):

- Weekly interviews with subsistence fishermen in lower Kuskokwim River to assess adequacy and quality of harvest.

-continued-

Project name: Kuskokwim River mark–recapture

Location: RM 179

Duration: June 10 to July 31

Agencies and responsibilities: ADF&G CF all aspects, KNA crew support, and AKSSF funding

Primary objective(s):

- Spaghetti tags were deployed on sockeye salmon caught using fish wheels near Kalskag in the mainstem Kuskokwim River and recovered upstream at several tributaries to determine stock-specific run timing, stock-specific travel speed, and to estimate total sockeye salmon run abundance using a 2 sample mark–recapture design.

Project name: Bethel test fishery

Location: Bethel Area RM 80

Duration: June to August

Agencies and responsibilities: ADF&G CF all aspects

Primary objective(s):

- Index relative run abundance of Chinook, sockeye, chum, and coho salmon using CPUE derived from drift gillnet catches.

Project name: Kwethluk River weir

Location: Kwelthluk River RM 99

Duration: June to September

Agencies and responsibilities: USFWS all aspects, ADF&G CF inseason data management, OVK crew support, and OSM funding

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, coho, and pink salmon into the Kwethluk River.
- Estimate age, sex and length composition of Chinook, chum, and coho salmon escapement.
- Collect environmental/habitat information.

Project name: Tuluksak River weir

Location: Tuluksak River RM 136

Duration: June to September

Agencies and responsibilities: USFWS all aspects, ADF&G CF inseason data management, TUTC crew support, and OSM funding

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, coho, and pink salmon into the Tuluksak River.
- Estimate age, sex, and length composition of Chinook, chum, and coho salmon escapement.
- Collect environmental/habitat information.

-continued-

Project name: George River weir

Location: George River RM 309

Duration: June to September

Agencies and responsibilities: KNA all aspects, ADF&G CF all aspects, and OSM funding

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, pink, and coho salmon into the George River.
- Estimate age, sex, and length composition of Chinook, chum, and coho salmon escapement.
- Collect environmental/habitat information.

Project name: Kogrukluk River weir

Location: Holitna River drainage RM 335

Duration: June to September

Agencies and responsibilities: ADF&G CF all aspects

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, and coho salmon into the Kogrukluk River.
- Estimate age, sex, and length composition of Chinook, chum, and coho salmon escapement.

Project name: Tatlawiksuk River weir

Location: Tatlawiksuk River RM 383

Duration: June to September

Agencies and responsibilities: KNA all aspects, ADF&G CF all aspects, and OSM funding

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, pink, and coho salmon into the Tatlawiksuk River.
- Estimate age, sex and length composition of Chinook, chum, and coho salmon escapement.
- Collect environmental/habitat information.

Project name: Pitka Fork (Salmon River) weir

Location: Pitka Fork of the Salmon River RM 18

Duration: June to August

Agencies and responsibilities: ADF&G CF planning and supplies, CSRI funding, MTNT staffing

Primary objective(s):

- Estimate daily escapement of Chinook and chum salmon into the Pitka Fork River.
- Estimate age, sex, and length composition of Chinook and chum salmon escapement.
- Collect environmental/habitat information.

-continued-

Project name: Telequana River weir

Location: Outlet of Lake Stony River RM 756

Duration: July to August

Agencies and responsibilities: NPS co-managed and ADF&G CF co-managed

Primary objective(s):

- Estimate daily escapement of sockeye salmon into the Telaquana River.
- Estimate age, sex, and length composition sockeye salmon escapement.
- Drainagewide genetic and tagging mark and recapture estimates.
- Collect environmental/habitat information.

Project name: Kanektok River weir

Location: Mile 13 Kanektok River, Kuskokwim Bay

Duration: June to September

Agencies and responsibilities: ADF&G CF all aspects, NVK crew support, OSM funding, and CVRF funding

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, pink, and coho salmon into the Kanektok River.
- Estimate age, sex, and length composition of Chinook, sockeye, and chum salmon escapement.

Project name: Middle Fork Goodnews River weir

Location: Mile 5 Middle Fork Goodnews River, Kuskokwim Bay

Duration: June to September

Agencies and responsibilities: ADF&G CF all aspects, USFWS crew support, and OSM funding – coho assessment

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, pink, and coho salmon into the Middle Fork Goodnews River.
- Estimate age, sex, and length composition of Chinook, sockeye, chum, and coho salmon escapement

Note: ADF&G/CF = Division of Commercial Fisheries, Alaska Department of Fish and Game

ADF&G/SF = Division of Sport Fish, Alaska Department of Fish and Game

KNA = Kuskokwim River Native Association

NPS = National Park Service

NVK = Native Village of Kwinhagak

ONC = Orutsararmuit Native council

OSM = Federal Office of Subsistence Management

OVK = Organized Village of Kwethluk

TTC = Takotna Tribal Council

TUTC = Tuluksak Traditional Council

USFWS = U.S. Fish and Wildlife Service

Appendix A7.–Subsistence Chinook salmon harvest estimates by community, Kuskokwim Management Area, 1990–2014.

Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Kongiganak	1,559	729	929	680	1,281	1,095	1,108	1,376	1,128	1,153
N. Kuskokwim Bay	1,559	729	929	680	1,281	1,095	1,108	1,376	1,128	1,153
Tuntutuliak	4,174	4,156	3,750	3,905	5,019	3,928	4,256	3,159	3,797	3,412
Eek	4,923	2,617	2,057	2,496	2,976	3,679	2,786	2,009	2,215	1,730
Kasigluk	3,300	2,875	*3,150*	*3,609*	*3,351*	*3,208*	*3,294*	*3,480*	*2,617*	*5,473*
Nunapitchuk	4,192	4,004	4,123	3,852	4,580	4,543	3,479	3,605	4,502	4,215
Atmautluak	2,895	1,661	1,239	1,715	1,856	2,016	1,752	1,648	1,397	1,372
Napakiak	4,427	2,573	4,147	3,822	3,355	3,515	3,842	2,908	3,436	2,265
Napaskiak	6,586	4,008	5,299	5,566	6,521	4,862	5,261	4,756	4,901	3,633
Oscarville	1,263	1,476	*1,501*	1,496	1,390	1,046	995	*1,056*	754	1,543
Bethel	34,925	18,041	22,220	19,800	31,251	32,463	32,116	20,100	24,877	22,751
Kwethluk	10,657	7,298	6,949	9,280	9,546	9,907	9,786	6,319	7,502	6,366
Akiachak	8,395	5,607	8,130	7,678	7,622	6,410	5,689	6,699	6,026	5,210
Akiak	5,966	3,168	3,452	4,478	4,653	4,401	4,851	3,196	2,943	2,377
Tuluksak	2,022	3,114	2,330	3,662	4,414	4,175	3,309	5,456	3,554	2,239
Lower Kuskokwim River	93,725	60,598	68,347	71,359	86,534	84,153	81,416	64,391	68,521	62,586
Lower Kalskag	2,946	4,022	2,338	3,603	4,087	4,541	3,513	3,103	1,954	1,726
Upper Kalskag	1,618	1,031	1,321	1,682	1,297	1,447	1,304	941	1,394	1,670
Aniak	3,589	3,562	3,976	4,651	3,714	3,506	3,343	3,640	3,466	2,603
Chuathbaluk	1,718	998	986	1,443	1,013	2,461	914	1,204	730	1,035
Middle Kuskokwim River	9,871	9,613	8,621	11,379	10,111	11,955	9,074	8,888	7,544	7,034
Crooked Creek	971	916	583	707	1,126	874	890	963	768	702
Red Devil	297	154	400	449	409	412	359	404	243	141
Sleetmute	777	887	782	1,795	1,295	964	1,265	1,171	978	414
Stony River	574	614	247	445	391	534	596	874	*293*	46
Lime Village	399	70	*162*	40	195	180	*141*	57	241	145
McGrath	896	902	1,586	550	1,026	804	1,223	995	872	1,033
Takotna	74	0	*6*	0	0	*11*	*7*	*3*	2	0
Nikolai	635	337	818	426	449	938	398	212	380	284
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	4,623	3,880	4,584	4,412	4,891	4,717	4,879	4,679	3,777	2,765
Kuskokwim River total	109,778	74,820	82,481	87,830	102,817	101,921	96,477	79,334	80,969	73,538
Quinhagak	3,881	3,753	4,394	3,634	3,977	2,864	3,506	3,186	3,774	2,815
Goodnews Bay	358	852	548	590	672	789	392	441	735	759
Platinum	202	20	67	75	74	24	*41*	14	*57*	69
South Kuskokwim Bay	4,441	4,625	5,009	4,299	4,723	3,677	3,939	3,641	4,566	3,643
Total estimate	114,219	79,445	87,490	92,129	107,540	105,598	100,417	82,975	85,535	77,181

-continued-

Appendix A7.–Page 2 of 3.

Community	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Kongiganak	1,285	1,612	1,349	2,003	2,663	1,536	1,729	*1,865*	2,233	1,243
N. Kuskokwim Bay	1,285	1,612	1,349	2,003	2,663	1,536	1,729	1,865	2,233	1,243
Tuntutuliak	2,826	2,958	3,907	2,657	3,912	4,545	4,469	4,614	*4,266*	3,067
Eek	2,140	2,035	2,514	2,075	2,954	3,133	*2,501*	*2,512*	*2,966*	1,982
Kasigluk	3,857	*5,054*	*4,685*	*4,711*	7,859	*5,242*	*4,905*	*5,167*	2,471	2,464
Nunapitchuk	3,425	3,328	4,503	3,179	4,921	4,103	4,121	4,661	*4,234*	3,468
Atmautluak	1,191	754	1,479	547	2,153	1,927	*1,758*	1,890	*1,298*	1,567
Napakiak	2,073	2,408	2,702	2,438	2,839	3,060	*5,125*	3,245	1,903	2,387
Napaskiak	4,175	4,596	3,922	3,390	4,058	4,485	5,877	6,392	4,555	5,372
Oscarville	*1,259*	1,779	1,115	1,153	1,325	1,069	1,052	1,360	1,351	754
Bethel	20,629	24,684	22,892	24,584	29,443	28,293	27,805	30,422	27,800	26,170
Kwethluk	5,174	6,460	6,880	4,206	7,157	6,089	7,258	6,466	8,451	7,130
Akiachak	6,311	6,978	6,946	2,493	7,131	5,411	5,561	7,621	9,719	7,361
Akiak	2,335	3,528	3,390	3,905	3,775	3,860	4,423	4,297	4,090	3,247
Tuluksak	2,464	2,520	2,860	3,286	3,766	2,655	2,372	*3,266*	2,937	3,212
Lower Kuskokwim River	57,859	67,082	67,795	58,624	81,293	73,872	77,228	81,914	76,040	68,181
Lower Kalskag	1,691	2,432	1,535	1,556	1,991	1,417	3,494	1,937	1,748	2,525
Upper Kalskag	1,234	1,149	1,545	1,328	2,498	2,533	1,569	1,383	2,435	1,696
Aniak	3,100	2,684	4,576	1,837	3,022	1,977	2,412	3,417	3,100	2,130
Chuathbaluk	281	700	505	405	1,460	913	887	*973*	772	877
Middle Kuskokwim River	6,306	6,965	8,161	5,126	8,971	6,840	8,362	7,710	8,055	7,228
Crooked Creek	592	689	859	582	946	948	736	*647*	488	608
Red Devil	95	174	293	31	156	181	232	301	148	258
Sleetmute	412	505	604	600	906	522	750	861	933	693
Stony River	*178*	167	415	118	688	*311*	*288*	*530*	514	704
Lime Village	69	251	*178*	34	69	*171*	*103*	*95*	*29*	*75*
McGrath	656	444	970	395	587	*910*	689	495	288	600
Takotna	0	5	10	*0*	16	*8*	0	*10*	*0*	*8*
Nikolai	144	280	535	*224*	493	*564*	696	*471*	184	298
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	2,146	2,515	3,864	1,984	3,861	3,615	3,494	3,409	2,584	3,244
Kuskokwim River total	67,596	78,174	81,169	67,737	96,788	85,863	90,812	94,898	88,912	79,896
Quinhagak	3,053	3,177	2,649	2,563	4,563	3,505	5,163	4,686	3,125	3,312
Goodnews Bay	564	863	723	807	863	869	713	*647*	898	569
Platinum	99	57	154	45	122	74	45	*66*	42	61
South Kuskokwim Bay	3,716	4,097	3,526	3,415	5,548	4,448	5,921	5,399	4,065	3,942
Total estimate	71,312	82,271	84,695	71,152	102,336	90,311	96,733	100,297	92,977	83,838

-continued-

Appendix A7.–Page 3 of 3.

Community	2010	2011	2012	2013	2014
Kongiganak	1,456	1,208	*287*	*641*	*964*
N. Kuskokwim Bay	1,456	1,208	287	641	964
Tuntutuliak	3,261	3,032	1,123	2,448	*574*
Eek	1,761	1,378	1,004	1,188	665
Kasigluk	3,014	2,823	552	2,919	205
Nunapitchuk	2,548	3,559	845	2,563	287
Atmautluak	1,088	1,236	234	1,592	108
Napakiak	1,674	1,963	457	1,588	311
Napaskiak	4,333	3,360	1,108	2,939	422
Oscarville	618	694	51	585	68
Bethel	26,157	25,093	7,321	17,246	3,089
Kwethluk	4,440	2,467	1,709	3,192	959
Akiachak	4,470	3,852	2,862	3,585	1,033
Akiak	3,625	2,455	*1,218*	1,449	530
Tuluksak	2,057	1,230	651	732	404
Lower Kuskokwim River	59,046	53,142	19,135	42,026	8,655
Lower Kalskag	1,030	1260	459	744	283
Upper Kalskag	1,496	1772	562	1,317	258
Aniak	2,262	2214	993	1,440	344
Chuathbaluk	551	409	103	155	90
Middle Kuskokwim River	5,339	5,655	2,117	3,656	975
Crooked Creek	240	402	124	*145*	35
Red Devil	33	186	225	77	83
Sleetmute	272	242	132	96	58
Stony River	189	134	*151*	51	24
Lime Village	*47*	*118*	29	*43*	*32*
McGrath	262	829	68	95	173
Takotna	*0*	0	*0*	*0*	*0*
Nikolai	402	450	276	283	235
Telida	–	–	–	–	–
Upper Kuskokwim River	1,445	2,361	1,005	790	609
Kuskokwim River total	67,286	62,366	22,544	47,113	11,203
Quinhagak	2,793	2,588	2,396	3,143	3,723
Goodnews Bay	480	834	389	413	431
Platinum	17	62	24	39	46
South Kuskokwim Bay	3,290	3,484	2,809	3,595	4,200
Total estimate	70,576	65,850	25,353	50,708	15,403

Note: Dashes indicate that harvest was not estimated and italic indicates Bayesian estimates.

Appendix A8.–Estimated number of sockeye salmon harvested in the Kuskokwim area, 1990–2014.

Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Kongiganak	552	498	923	583	743	658	951	976	878	908
N. Kuskokwim Bay	552	498	923	583	743	658	951	976	878	908
Tuntutuliak	2,132	1,768	1,846	1,063	3,289	1,082	1,561	1,724	1,227	2,070
Eek	1,293	479	669	363	452	308	526	503	375	595
Kasigluk	843	1,376	*1,690*	*1,608*	*976*	*1,179*	*1,127*	*1,315*	*1,012*	*3,287*
Nunapitchuk	1,520	2,193	2,329	2,743	1,633	870	1,877	2,082	2,029	3,258
Atmautluak	1,696	830	1,193	1,313	837	1,173	1,408	681	982	1,743
Napakiak	1,548	1,187	1,663	1,217	1,533	887	1,106	1,526	1,487	2,018
Napaskiak	1,660	2,850	3,116	3,508	1,933	1,573	3,180	2,209	1,457	1,929
Oscarville	287	726	*938*	957	398	301	208	*442*	249	1,724
Bethel	11,787	11,428	9,225	9,501	11,370	8,802	10,556	10,233	8,464	12,094
Kwethluk	4,271	3,746	1,958	3,802	3,864	2,536	3,963	3,288	3,785	3,485
Akiachak	3,461	4,029	3,970	4,990	3,241	1,942	2,767	2,737	2,395	3,066
Akiak	1,873	1,696	1,769	3,537	1,740	809	1,544	1,327	1,640	1,151
Tuluksak	1,225	3,427	2,063	2,452	1,390	1,270	1,108	1,514	1,413	1,412
Lower Kuskokwim River	33,596	35,735	32,428	37,054	32,656	22,732	30,931	29,581	26,515	37,832
Lower Kalskag	1,007	1,080	503	2,286	989	679	1,387	1,277	546	583
Upper Kalskag	284	314	354	346	288	82	284	216	238	586
Aniak	1,539	2,073	1,213	1,609	751	955	1,295	1,078	1,132	1,302
Chuathbaluk	1,157	1,471	497	822	924	465	687	796	223	441
Middle Kuskokwim River	3,987	4,938	2,567	5,063	2,952	2,181	3,653	3,367	2,139	2,912
Crooked Creek	1,607	968	738	752	558	177	311	350	717	710
Red Devil	455	391	355	662	336	576	914	637	692	497
Sleetmute	1,153	1,347	794	1,643	1,120	1,109	1,341	1,458	1,282	879
Stony River	933	1,966	1,389	1,485	758	1,281	1,267	1,626	*1,023*	1,018
Lime Village	2,125	1,110	*1,304*	2,743	1,733	857	*1,225*	642	2,782	2,619
McGrath	1,489	416	2,494	1,465	1,501	1,652	111	52	146	0
Takotna	0	0	*1*	0	0	*2*	*1*	*1*	0	0
Nikolai	0	1	0	5	25	65	23	0	16	43
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	7,762	6,199	7,075	8,755	6,031	5,719	5,193	4,766	6,658	5,766
Kuskokwim River total	45,897	47,370	42,993	51,455	42,382	31,290	40,728	38,690	36,190	47,418
Quinhagak	1,710	1,818	1,448	1,228	962	597	499	460	1,368	1,433
Goodnews Bay	982	1,061	1,293	733	646	202	387	480	499	715
Platinum	163	134	238	48	90	32	*56*	143	*80*	106
South Kuskokwim Bay	2,855	3,013	2,979	2,009	1,698	831	942	1,083	1,947	2,254
Total estimate	48,752	50,383	45,972	53,464	44,080	32,121	41,669	39,773	38,137	49,672

-continued-

Community	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Kongiganak	1,770	1,546	1,347	929	1,809	1,103	1,464	*960*	1,502	1,018
N. Kuskokwim Bay	1,770	1,546	1,347	929	1,809	1,103	1,464	960	1,502	1,018
Tuntutuliak	1,180	1,702	1,045	1,148	1,620	2,145	1,834	1,763	*2,120*	932
Eek	883	1,085	759	586	567	1,033	*684*	*558*	*834*	1,019
Kasigluk	3,805	*3,213*	*2,111*	*2,429*	1,668	*1,634*	*2,248*	*1,786*	1,041	1,215
Nunapitchuk	2,194	2,529	1,500	1,714	1,659	1,821	1,871	2,147	*2,549*	1,538
Atmautluak	1,540	988	1,150	679	1,103	1,444	*1,012*	1,041	*1,250*	624
Napakiak	1,916	1,917	1,688	1,453	1,351	2,122	1,845	1,962	1,244	917
Napaskiak	2,525	3,377	1,296	1,643	1,148	1,344	1,784	1,738	2,620	1,579
Oscarville	*1,115*	1,451	400	806	436	278	778	712	677	332
Bethel	11,613	14,264	8,850	12,198	11,679	14,297	12,816	13,902	15,247	11,272
Kwethluk	3,859	4,191	2,100	1,903	3,302	2,457	2,770	3,536	4,920	2,432
Akiachak	3,687	4,680	2,507	1,607	3,109	2,372	2,661	3,269	4,354	2,407
Akiak	1,036	2,005	1,214	995	1,258	1,920	2,000	3,695	2,881	1,290
Tuluksak	2,201	1,862	1,205	875	1,670	987	2,247	*1,845*	2,133	1,691
Lower Kuskokwim River	37,554	43,264	25,825	28,036	30,570	33,854	34,550	37,955	41,869	27,248
Lower Kalskag	824	918	347	515	775	439	1,434	780	1,583	1,044
Upper Kalskag	588	319	508	431	686	945	563	417	1,000	369
Aniak	1,136	2,167	1,059	756	996	1,015	692	1,261	1,585	923
Chuathbaluk	476	614	313	274	526	369	508	*484*	363	564
Middle Kuskokwim River	3,024	4,018	2,227	1,976	2,983	2,768	3,197	2,942	4,531	2,900
Crooked Creek	514	640	449	571	732	693	544	*523*	220	329
Red Devil	109	360	109	309	88	272	510	318	359	477
Sleetmute	725	1,008	706	504	980	673	1,181	1,303	1,164	684
Stony River	*654*	163	602	158	896	*688*	*746*	*1,019*	1,476	977
Lime Village	1,409	1,453	*1,186*	374	874	*1,368*	*1,216*	*1,406*	*659*	*1,080*
McGrath	43	273	407	112	194	*454*	149	375	417	965
Takotna	0	0	0	*1*	0	*1*	0	*1*	*3*	*3*
Nikolai	0	0	22	*2*	1	*10*	20	*14*	13	66
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	3,454	3,897	3,481	2,031	3,765	4,160	4,365	4,960	4,310	4,581
Kuskokwim River total	45,802	52,725	32,880	32,973	39,127	41,885	43,577	46,817	52,213	35,747
Quinhagak	1,368	1,054	909	805	1,375	1,745	3,128	1,755	2,097	1,960
Goodnews Bay	951	908	855	705	873	1,213	995	*920*	1,739	902
Platinum	188	83	257	64	183	90	63	*121*	156	186
South Kuskokwim Bay	2,507	2,045	2,021	1,574	2,431	3,048	4,186	2,796	3,992	3,048
Total estimate	48,309	54,770	34,901	34,547	41,558	44,933	47,763	49,613	56,205	38,795

-continued-

Appendix A8.–Page 3 of 3.

Community	2010	2011	2012	2013	2014
Kongiganak	1,869	1,266	*1,307*	*1,031*	*1,230*
N. Kuskokwim Bay	1,869	1,266	1,307	1,031	1,230
Tuntutuliak	2,068	1,274	1,516	1,183	*1,774*
Eek	1,241	664	1,490	1,319	1,450
Kasigluk	1,441	1,269	1,451	1,470	1,990
Nunapitchuk	1,902	2,223	2,396	1,806	2,059
Atmautluak	731	827	1,623	1,316	1,531
Napakiak	1,183	1,351	1,141	1,105	1,573
Napaskiak	1,979	1,587	2,065	2,069	2,514
Oscarville	250	228	323	347	679
Bethel	11,103	16,946	18,282	12,616	14,828
Kwethluk	2,534	2,357	2,884	2,705	5,921
Akiachak	2,433	2,647	3,443	2,594	3,047
Akiak	1,161	2,576	*1,818*	1,731	2,418
Tuluksak	2,483	1,699	1,380	1,541	622
Lower Kuskokwim River	30,509	35,648	39,812	31,802	40,406
Lower Kalskag	507	802	891	977	1,040
Upper Kalskag	460	938	770	662	839
Aniak	1,165	1,168	1,375	1,466	1,578
Chuathbaluk	403	300	297	480	481
Middle Kuskokwim River	2,535	3,208	3,333	3,585	3,938
Crooked Creek	302	243	234	*514*	391
Red Devil	475	502	511	270	151
Sleetmute	1,024	693	715	362	541
Stony River	372	303	*469*	447	137
Lime Village	*932*	*739*	780	*831*	*888*
McGrath	650	630	233	538	451
Takotna	*2*	0	2	2	3
Nikolai	65	13	0	0	236
Telida	–	–	–	–	–
Upper Kuskokwim River	3,822	3,123	2,945	2,964	2,798
Kuskokwim River total	38,735	43,245	47,396	39,382	48,372
Quinhagak	1,719	1,582	2,015	2,158	2,939
Goodnews Bay	1,093	1,328	1,197	1,113	1,370
Platinum	175	135	173	181	349
South Kuskokwim Bay	2,987	3,045	3,385	3,452	4,658
Total estimate	41,722	46,290	50,781	42,834	53,030

Note: Dashes indicate that harvest was not estimated and italic indicates Bayesian estimates.

Appendix A9.–Estimated number of coho salmon harvested in the Kuskokwim area, 1990–2014.

Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Kongiganak	474	490	605	448	569	662	579	514	204	203
N. Kuskokwim Bay	474	490	605	448	569	662	579	514	204	203
Tuntutuliak	1,287	733	693	820	364	339	1,335	558	858	277
Eek	1,800	387	502	160	399	387	437	63	314	242
Kasigluk	922	1,723	*1,388*	*372*	*532*	*90*	*519*	*170*	*330*	*3,906*
Nunapitchuk	746	1,131	2,242	318	749	629	1,444	732	345	368
Atmautluak	398	237	333	380	402	634	534	485	283	190
Napakiak	1,470	599	1,570	586	871	344	602	161	739	459
Napaskiak	1,139	798	1,108	780	2,016	584	506	592	488	316
Oscarville	57	147	*151*	0	48	0	15	*0*	0	779
Bethel	32,988	17,677	24,908	12,310	17,082	22,007	21,982	17,077	12,058	11,565
Kwethluk	3,928	2,311	2,419	1,809	1,880	1,690	2,995	1,104	1,583	2,883
Akiachak	1,910	2,337	3,058	1,102	1,281	628	903	383	409	662
Akiak	1,789	2,193	1,072	1,373	1,099	481	920	798	521	259
Tuluksak	978	1,854	1,629	408	223	522	1,175	418	812	298
Lower Kuskokwim River	49,412	32,127	41,074	20,418	26,946	28,335	33,367	22,541	18,740	22,204
Lower Kalskag	445	500	526	823	881	715	1,246	572	345	285
Upper Kalskag	346	527	972	353	178	257	348	661	834	155
Aniak	1,669	1,171	1,933	1,104	1,768	1,244	2,723	1,428	1,284	1,419
Chuathbaluk	826	87	368	366	741	79	409	196	50	138
Middle Kuskokwim River	3,286	2,285	3,799	2,646	3,568	2,295	4,726	2,857	2,513	1,997
Crooked Creek	922	279	712	396	646	358	175	261	394	529
Red Devil	914	1,038	1,284	1,673	1,074	1,539	1,135	1,455	504	424
Sleetmute	1,036	1,588	937	912	626	1,104	870	419	267	210
Stony River	474	513	727	511	477	1,023	529	455	*378*	423
Lime Village	486	390	*345*	606	1,467	223	*607*	270	776	701
McGrath	466	477	2,146	563	998	604	824	745	734	338
Takotna	0	0	*4*	0	0	*6*	*6*	*2*	3	0
Nikolai	90	65	204	285	94	499	36	130	97	73
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	4,388	4,350	6,358	4,946	5,382	5,356	4,182	3,737	3,153	2,698
Kuskokwim River total	57,560	39,252	51,836	28,458	36,465	36,648	42,854	29,649	24,611	27,102
Quinhagak	3,799	3,230	3,291	2,029	2,544	2,480	1,734	1,105	1,537	1,781
Goodnews Bay	1,630	1,704	1,671	1,118	428	268	330	348	323	421
Platinum	95	36	290	27	87	11	*46*	55	*75*	147
South Kuskokwim Bay	5,524	4,970	5,252	3,174	3,059	2,759	2,110	1,508	1,935	2,349
Total estimate	63,084	44,222	57,088	31,632	39,524	39,407	44,964	31,157	26,546	29,451

-continued-

Appendix A9.–Page 2 of 3.

Community	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Kongiganak	339	919	1,138	236	937	740	657	*883*	557	561
N. Kuskokwim Bay	339	919	1,138	236	937	740	657	883	557	561
Tuntutuliak	3,264	335	1,239	2,092	1,189	1,074	948	703	*1,620*	359
Eek	493	241	821	747	1,018	378	*773*	*459*	*661*	176
Kasigluk	9,726	*1,058*	*2,195*	*1,762*	5,034	*1,304*	*3,070*	*1,753*	867	629
Nunapitchuk	355	425	821	627	555	807	692	1,752	*508*	286
Atmautluak	227	375	612	283	744	530	*254*	424	*262*	67
Napakiak	453	667	793	992	1,648	742	2,363	1,244	1,006	420
Napaskiak	836	455	717	983	655	602	1,640	639	903	786
Oscarville	*216*	90	161	19	304	60	175	180	62	67
Bethel	13,478	14,108	15,489	15,062	17,040	12,994	18,810	12,972	15,839	12,895
Kwethluk	3,435	1,773	2,706	1,787	3,430	3,048	1,245	1,624	7,262	4,333
Akiachak	2,555	1,912	1,690	1,627	2,397	1,817	1,714	2,355	4,311	1,790
Akiak	479	594	1,136	1,094	1,342	1,847	379	1,325	1,358	661
Tuluksak	520	1,136	1,349	921	1,007	484	498	*1,131*	635	857
Lower Kuskokwim River	36,037	23,169	29,729	27,996	36,363	25,687	32,561	26,561	35,293	23,326
Lower Kalskag	403	597	281	314	368	319	1,415	515	76	318
Upper Kalskag	286	536	1,069	462	1,500	594	1,799	381	2,350	181
Aniak	1,911	2,006	3,737	1,164	2,355	2,032	1,018	3,003	2,883	2,223
Chuathbaluk	462	733	610	259	284	346	727	*419*	525	96
Middle Kuskokwim River	3,062	3,872	5,697	2,199	4,507	3,291	4,959	4,318	5,834	2,818
Crooked Creek	137	97	440	375	713	312	401	*289*	952	283
Red Devil	161	426	499	351	65	331	171	193	307	126
Sleetmute	525	428	806	731	505	581	671	360	228	403
Stony River	*348*	397	662	214	679	*468*	*322*	*336*	552	634
Lime Village	556	559	*680*	46	231	*372*	*132*	*443*	*695*	*210*
McGrath	881	436	1,508	997	1,228	*799*	894	279	247	1,175
Takotna	20	31	25	*6*	51	*8*	0	*8*	*6*	*28*
Nikolai	30	131	93	*379*	171	*166*	407	*95*	53	203
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	2,658	2,505	4,713	3,099	3,643	3,037	2,998	2,005	3,040	3,062
Kuskokwim River total	42,096	30,465	41,277	33,531	45,450	32,755	41,175	33,766	44,724	29,767
Quinhagak	1,042	1,719	1,133	1,868	1,435	1,558	1,315	1,550	1,869	1,824
Goodnews Bay	380	548	198	1,228	1,542	634	605	*468*	769	261
Platinum	100	118	96	144	266	223	116	*106*	114	81
South Kuskokwim Bay	1,522	2,385	1,427	3,240	3,243	2,415	2,036	2,124	2,752	2,166
Total estimate	43,618	32,850	42,704	36,771	48,693	35,170	43,211	35,890	47,476	31,933

-continued-

Community	2010	2011	2012	2013	2014
Kongiganak	483	613	*356*	*412*	*561*
N. Kuskokwim Bay	483	613	356	412	561
Tuntutuliak	698	250	565	450	*794*
Eek	315	280	612	483	555
Kasigluk	1,043	430	303	418	851
Nunapitchuk	195	407	319	226	1,305
Atmautluak	36	263	383	203	176
Napakiak	877	927	402	634	740
Napaskiak	1,029	471	269	772	1,153
Oscarville	12	43	38	37	128
Bethel	20,426	18,141	13,280	12,662	19,364
Kwethluk	1,495	1,097	1,013	1,555	4,422
Akiachak	1,181	1,440	714	1,106	1,845
Akiak	475	505	*455*	454	1,501
Tuluksak	330	163	341	473	808
Lower Kuskokwim River	28,112	24,417	18,694	19,473	33,642
Lower Kalskag	96	684	1,107	529	907
Upper Kalskag	92	998	360	636	938
Aniak	2,533	2,215	3,365	3,102	9,566
Chuathbaluk	76	109	179	319	291
Middle Kuskokwim River	2,797	4,006	5,011	4,586	11,702
Crooked Creek	87	297	149	*255*	198
Red Devil	88	130	238	318	792
Sleetmute	458	426	784	219	993
Stony River	201	333	*358*	120	177
Lime Village	*146*	*596*	117	*384*	*226*
McGrath	1,053	1,331	2,257	523	1,189
Takotna	*20*	3	22	0	0
Nikolai	135	20	214	119	256
Telida	–	–	–	–	–
Upper Kuskokwim River	2,188	3,136	4,139	1,938	3,831
Kuskokwim River total	33,580	32,172	28,200	26,409	49,736
Quinhagak	1,599	1,369	1,380	1,087	2,240
Goodnews Bay	319	259	382	295	371
Platinum	197	143	124	50	240
South Kuskokwim Bay	2,115	1,771	1,886	1,432	2,851
Total estimate	35,695	33,943	30,086	27,841	52,587

Note: Dashes indicate that harvest was not estimated and italic indicates Bayesian estimates.

Appendix A10.–Estimated number of chum salmon harvested in the Kuskokwim area, 1990–2014.

Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Kongiganak	1,009	978	1,584	708	1,414	1,269	1,763	753	1,579	1,049
N. Kuskokwim Bay	1,009	978	1,584	708	1,414	1,269	1,763	753	1,579	1,049
Tuntutuliak	6,592	4,697	6,245	3,325	5,346	3,509	6,119	2,435	3,640	1,709
Eek	3,014	790	1,324	250	591	899	999	556	795	484
Kasigluk	3,877	3,013	*4,076*	*2,522*	*2,663*	*2,774*	*4,047*	*1,951*	*2,543*	*4,777*
Nunapitchuk	6,448	5,840	9,195	4,895	4,560	4,264	6,255	2,465	4,885	4,428
Atmautluak	4,676	2,241	2,614	1,300	1,420	3,768	2,660	1,395	1,875	1,552
Napakiak	9,714	2,351	5,474	2,269	3,819	2,820	4,352	1,430	3,605	1,495
Napaskiak	11,334	6,703	7,817	3,653	5,797	4,137	6,200	2,318	3,771	2,529
Oscarville	1,400	1,147	*1,598*	561	676	740	1,548	*348*	378	1,530
Bethel	34,257	16,781	17,231	8,608	15,722	17,416	21,706	8,078	12,522	9,918
Kwethluk	11,451	5,714	8,001	3,499	6,340	6,114	12,043	3,266	4,508	3,582
Akiachak	10,565	5,921	9,532	3,308	5,998	3,992	5,019	1,615	2,218	2,696
Akiak	9,226	6,575	6,679	7,577	4,483	2,007	4,967	1,639	1,894	1,210
Tuluksak	5,863	5,454	4,632	3,774	2,395	2,698	3,208	2,790	3,044	1,480
Lower Kuskokwim River	118,417	67,227	84,418	45,541	59,810	55,138	79,123	30,286	45,678	37,390
Lower Kalskag	4,980	2,958	2,807	2,938	2,856	1,438	4,070	1,298	968	733
Upper Kalskag	1,406	3,139	3,040	591	836	1,326	1,565	349	464	649
Aniak	10,160	3,511	7,687	2,926	2,538	3,454	8,569	1,678	4,964	1,753
Chuathbaluk	4,408	2,138	2,644	2,879	1,495	1,701	2,175	1,135	925	698
Middle Kuskokwim River	20,954	11,746	16,178	9,334	7,725	7,919	16,379	4,460	7,321	3,833
Crooked Creek	2,977	1,326	1,242	664	757	332	355	313	2,527	830
Red Devil	1,613	1,133	1,500	927	1,318	882	727	499	462	169
Sleetmute	2,006	1,880	2,961	692	1,520	1,683	1,250	417	870	340
Stony River	1,234	638	1,165	775	881	1,311	443	600	*395*	296
Lime Village	2,350	830	*1,299*	497	1,600	789	*306*	244	964	1,015
McGrath	2,326	1,083	4,472	578	1,264	1,525	211	138	1,510	242
Takotna	64	0	*15*	0	6	*1*	*0*	*0*	15	0
Nikolai	875	396	914	334	293	297	229	60	519	87
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	13,445	7,286	13,568	4,467	7,639	6,820	3,521	2,271	7,262	2,979
Kuskokwim River total	153,825	87,237	115,748	60,050	76,588	71,146	100,786	37,770	61,840	45,251
Quinhagak	3,161	1,631	2,287	1,053	1,401	669	943	572	1,375	1,587
Goodnews Bay	200	136	1,311	177	406	140	221	135	295	232
Platinum	149	4	137	0	51	3	*26*	0	*51*	33
South Kuskokwim Bay	3,510	1,771	3,735	1,230	1,858	812	1,190	707	1,721	1,852
Total estimate	157,335	89,008	119,483	61,280	78,446	71,958	101,975	38,477	63,561	47,103

-continued-

Appendix A10.–Page 2 of 3.

Community	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Kongiganak	1,839	2,399	3,247	897	2,958	1,960	2,420	*2,353*	1,755	1,420
N. Kuskokwim Bay	1,839	2,399	3,247	897	2,958	1,960	2,420	2,353	1,755	1,420
Tuntutuliak	2,622	2,585	4,150	1,288	2,546	3,568	4,024	3,350	*3,375*	3,330
Eek	636	402	1,228	578	688	877	*1,075*	*783*	*788*	782
Kasigluk	4,689	*5,158*	*5,513*	*3,581*	5,064	*4,194*	*5,461*	*4,309*	1,502	1,857
Nunapitchuk	4,865	4,724	8,002	2,865	5,053	4,167	5,150	6,619	*4,705*	3,468
Atmautluak	1,848	1,397	2,514	849	2,271	1,940	*2,337*	2,193	*2,177*	1,665
Napakiak	2,859	1,793	3,421	1,560	2,328	3,238	8,143	3,628	1,313	1,638
Napaskiak	2,757	2,364	4,010	2,061	2,705	2,205	4,323	3,032	2,400	1,451
Oscarville	*1,237*	1,831	1,319	804	828	686	1,151	932	847	534
Bethel	10,149	10,757	17,731	11,452	13,448	14,273	20,953	16,540	15,853	10,055
Kwethluk	5,232	4,601	8,019	2,294	4,288	4,328	6,328	6,291	5,729	4,111
Akiachak	4,719	3,170	5,173	2,650	3,880	2,428	4,333	4,782	6,856	2,872
Akiak	2,617	2,240	2,571	2,928	3,499	3,528	3,095	4,141	3,522	1,350
Tuluksak	2,492	2,068	3,719	894	2,433	2,183	3,094	*3,202*	2,920	1,570
Lower Kuskokwim River	46,722	43,090	67,370	33,804	49,031	47,615	69,466	59,803	51,988	34,683
Lower Kalskag	1,534	1,498	1,445	1,087	1,316	997	4,703	1,997	1,004	930
Upper Kalskag	1,550	1,502	2,460	516	1,656	1,201	2,469	294	2,432	329
Aniak	1,933	1,934	4,367	820	2,535	2,952	3,722	4,108	2,830	2,602
Chuathbaluk	654	2,711	1,458	2,502	2,352	530	1,451	*1,541*	593	937
Middle Kuskokwim River	5,671	7,645	9,730	4,925	7,859	5,680	12,345	7,940	6,859	4,798
Crooked Creek	809	1,211	1,417	750	1,583	1,064	1,513	*813*	352	519
Red Devil	54	334	384	63	135	214	41	186	188	244
Sleetmute	371	379	1,293	468	1,054	422	1,475	818	373	367
Stony River	*320*	172	696	361	754	*324*	*790*	*540*	1,247	771
Lime Village	451	651	*869*	110	199	*573*	*316*	*419*	*297*	*405*
McGrath	188	247	969	513	290	*470*	999	464	676	825
Takotna	0	10	1	*0*	0	*4*	0	*0*	*0*	*0*
Nikolai	56	53	187	*191*	277	*230*	308	*223*	54	292
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	2,249	3,057	5,816	2,456	4,292	3,301	5,442	3,464	3,187	3,423
Kuskokwim River total	56,480	56,191	86,163	42,082	64,140	58,555	89,674	73,560	63,789	44,324
Quinhagak	895	808	2,011	559	1,383	994	2,754	2,249	1,794	1,557
Goodnews Bay	251	187	349	200	240	192	555	*395*	586	138
Platinum	82	60	95	19	42	21	108	*77*	106	28
South Kuskokwim Bay	1,228	1,055	2,455	778	1,665	1,207	3,417	2,720	2,486	1,723
Total estimate	57,708	57,246	88,618	42,860	65,805	59,762	93,091	76,281	66,275	46,047

-continued-

Community	2010	2011	2012	2013	2014
Kongiganak	2,522	2,809	*1,638*	*1,397*	*1,915*
N. Kuskokwim Bay	2,522	2,809	1,638	1,397	1,915
Tuntutuliak	2,439	1,865	2,614	2,180	*2,967*
Eek	721	486	1,552	1,232	1,182
Kasigluk	2,338	2,029	3,261	2,197	3,612
Nunapitchuk	3,223	4,257	5,312	2,977	5,213
Atmautluak	1,386	1,864	2,701	2,409	3,327
Napakiak	1,759	1,546	1,711	1,185	2,392
Napaskiak	3,110	1,783	3,216	2,589	3,171
Oscarville	352	402	599	490	599
Bethel	9,575	15,324	26,872	12,506	18,017
Kwethluk	3,112	3,484	3,849	3,825	4,318
Akiachak	2,856	3,205	4,150	3,417	4,744
Akiak	1,163	2,421	*2,925*	2,212	2,982
Tuluksak	3,180	2,697	2,585	3,062	2,274
Lower Kuskokwim River	35,214	41,363	61,347	40,281	54,798
Lower Kalskag	691	1,643	3,284	1,214	1,458
Upper Kalskag	391	1,599	1,930	1,534	1,038
Aniak	2,515	2,391	5,667	2,880	4,695
Chuathbaluk	535	686	796	935	805
Middle Kuskokwim River	4,132	6,319	11,677	6,563	7,996
Crooked Creek	539	862	610	*1,803*	391
Red Devil	122	434	516	981	284
Sleetmute	524	689	1,004	542	633
Stony River	338	516	*491*	27	89
Lime Village	*314*	*499*	419	*909*	*295*
McGrath	944	476	885	598	642
Takotna	*0*	0	*0*	*12*	*0*
Nikolai	440	349	1,044	513	1,356
Telida	–	–	–	–	–
Upper Kuskokwim River	3,221	3,825	4,970	5,386	3,690
Kuskokwim River total	45,089	54,316	79,631	53,627	68,398
Quinhagak	1,347	1,255	2,001	1,958	1,959
Goodnews Bay	324	349	322	153	268
Platinum	37	70	76	90	62
South Kuskokwim Bay	1,708	1,674	2,399	2,201	2,289
Total estimate	46,797	55,990	82,030	55,828	70,687

Note: Dashes indicate that harvest was not estimated and italic indicates Bayesian estimates.

Appendix A11.–Commercial salmon harvest and exvessel value by district, Kuskokwim Management Area, 2014.

	Chinook	Sockeye	Coho	Pink	Chum	Total
Lower Kuskokwim River, District 1						
Fish	0	2,720	117,588	3	19,080	139,391
Pounds	0	15,959	759,749	13	119,397	895,118
Price	$1.00	$1.25	$0.95	$0.00	$0.60	
Value	$0	$19,949	$751,850	$0	$71,638	$843,356
Recent 10-yr average 2004–2013						
Fish	2,837	13,031	148,438	4	58,024	222,333
Value	$24,287	$60,246	$448,124	$0	$125,224	$657,881
Quinhagak, District 4						
Fish	2,265	58,879	52,317	0	14,563	128,024
Pounds	22,940	326,686	368,282	0	99,809	817,717
Price	$1.00	$1.25	$0.96	$0.00	$0.60	
Value	$22,940	$408,358	$353,551	$0	$59,885	$858,639
Recent 10-yr average 2004–2013						
Fish	15,450	74,196	43,458	2	61,871	194,976
Value	$149,357	$329,662	$157,773	$0	$173,721	$810,514
Goodnews Bay, District 5						
Fish	205	20,515	52,158	0	3,403	76,281
Pounds	3,065	121,957	415,146	0	23,557	563,725
Price	$1.00	$1.25	$0.98	$0.00	$0.60	
Value	$3,065	$152,446	$406,843	$0	$14,134	$584,655
Recent 10-yr average 2004–2013						
Fish	1,928	31,866	16,026	1	13,259	63,080
Value	$19,252	$156,843	$75,111	$0	$39,827	$291,034
Kuskokwim Area total						
Fish	2,470	82,114	222,063	3	37,046	343,696
Pounds	26,005	464,602	1,543,177	13	242,763	2,276,560
Price	$1.00	$1.25	$0.96	$0.00	$0.60	
Value	$26,005	$580,397	$1,534,677	$0	$145,570	$2,286,649
Recent 10-yr average 2004–2013						
Fish	20,214	115,878	207,715	4	133,186	476,998
Value	$192,897	$546,752	$681,008	$1	$338,772	$1,759,429

Appendix A12.–Commercial and subsistence salmon fishing emergency order summary, Kuskokwim Management Area, 2014.

EO Number: 3-S-WR-01-14

Effective Date: June 1–July 25, 2014

Aniak to the headwaters of the Kuskokwim River, Subsistence gillnets restricted to gillnets with 4.0 inch or less mesh size not exceeding 60 feet in length and 45 meshes deep.

EO Number: 3-S-WR-02-14

Effective Date: June 1–July 31, 2014

Marine waters near the Kuskokwim River mouth; Subsistence fishing closed from a point east of the Ishkowik River at 59°58.928′N, 162°40.659′W to the northern boundary of District W-4 (at Weelung Creek).

EO Number: 3-S-WB-01-14

Effective Date: June 2–June 30, 2014; 12:01 AM–12:01 AM

District W-4, subsistence fishing for salmon is closed.

EO Number: 3-S-WB-02-14

Effective Date: June 2–June 30, 2014; 12:01 AM–12:01 AM

District W-5, subsistence fishing for salmon restricted to gillnets with 6.0 inch or less mesh size, not to exceed 50 fathoms in length.

EO Number: 3-S-WR-03-14

Effective Date: June 3–July 31, 2014

Marine waters along the Kuskokwim Delta coast, subsistence fishing restricted to gillnets with 6.0 inch or less mesh size from a point east of the Ishkowik River at 59°58.928′N, 162°40.659′W, west and north to Naskonat Peninsula

EO Number: 3-S-WR-04-14

Effective Date: June 10–July 31, 2014

Yukon Delta NWR boundary at Aniak to the Headwaters of the Kuskokwim River, subsistence fishing for Chinook salmon with hook and line is closed.

EO Number: 3-S-WR-05-14

Effective Date: June 15–June 30, 2014; 9:00 AM–9:00 PM

Mouth of the Kuskokwim River to the Yukon Delta NWR boundary at Aniak, Subsistence fishing with dip nets is allowed for 12 hours daily. Any Chinook caught must be returned immediately to the water unharmed.

EO Number: 3-S-WR-06-14

Effective Date: June 19–September 30, 2014; 9:00 AM–9:00 PM

Yukon Delta NWR boundary at Aniak to the Headwaters of the Kuskokwim River, Subsistence fishing with dip nets is allowed 12 hours daily, Any Chinook caught must be returned immediately to the water unharmed.

EO Number: 3-S-WR-07-14

Effective Date: June 20–July 31, 2014; 4:00 PM–12:00 PM

Marine waters near the Kuskokwim River mouth to the Johnson River, subsistence fishing allowed with 6.0 inch or less mesh size not exceeding 50 fathoms in length and 45 meshes deep.

-continued-

EO Number: 3-S-WR-08-14

Effective Date: June 24–September 30, 2014; 8:00 AM–12:00 PM

Lower boundary of Subdistrict 1-B to Johnson River, subsistence fishing allowed with 6.0 inch or less mesh size not exceeding 50 fathoms in length except for the area between Tuluksak and the Johnson River where gillnets may not exceed 25 fathoms in length.

EO Number: 3-S-WR-09-14

Effective Date: June 24–September 30, 2014; 2:00 PM–12:00 PM

Lower Boundary of Subdistrict 1-B to the Yukon Delta NWR boundary at Aniak, subsistence fishing restricted to gillnets with 4.0 inch or less mesh, 60 feet in length, and 45 meshes in depth. Subsistence hook and line fishing is also closed.

EO Number: 3-S-WR-10-14

Effective Date: June 27–September 30, 2014; 8:00 AM–12:00 PM

The lower boundary of Subdistrict 1-B to Chuathbaluk, subsistence fishing allowed with gillnets with 6.0 inch or less mesh and 50 fathoms in length. This area does not include tributaries and select sloughs.

EO Number: 3-S-WR-11-14

Effective Date: June 30–September 30, 2014; 10:00 AM–12:00 PM

Johnson River to Holitna River, subsistence fishing allowed with gillnets with 6.0 inch or less mesh and 50 fathoms in length.

EO Number: 3-S-WR-12-14

Effective Date: June 30–July 12, 2014; 9:00 PM–9:00 PM

Mouth of the Kuskokwim River to Chuathbaluk, subsistence fishing with dip nets is allowed 24 hours a day.

EO Number: 3-S-WR-13-14

Effective Date: July 1–July 31, 2014; 12:00 PM–12:00 PM

Coastal waters of the Kuskokwim Delta, Subsistence fishing with gillnets is unrestricted.

EO Number: 3-S-WR-14-14

Effective Date: July 3–September 30, 2014; 10:00 AM–12:00 PM

Chuathbaluk to the Headwaters of the Kuskokwim River, subsistence fishing allowed with gillnets with 6.0 inch or less mesh size and 50 fathoms in length. Holitna River to the Headwaters of the Kuskokwim River, subsistence hook and line fishing allowed with a daily bag limit of 3 fish and no possession limit.

EO Number: 3-S-WB-03-14

Effective Date: July 9–September 8, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, The commercial salmon fishing season is open.

EO Number: 3-S-WB-04-14

Effective Date: July 9, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for 12 hours.

EO Number: 3-S-WB-05-14

Effective Date: July 11, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for 12 hours.

-continued-

EO Number: 3-S-WR-15-14

Effective Date: July 14, 2014; 12:00 PM–6:00 PM

Subdistrict 1-B, Commercial salmon fishing will open in the upper section of Subdistrict 1-B for 4 hours. Commercial salmon fishing will open in the lower section of Subdistrict 1-B for 6 hours.

EO Number: 3-S-WB-06-14

Effective Date: July 14 and July 16, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for two 12 hour periods.

EO Number: 3-S-WR-16-14

Effective Date: July 18, 2014; 1:00 AM–9:00 PM

Subdistrict 1-B, Commercial fishing will open in the upper section of Subdistrict 1-B for 6 hours. Commercial fishing will open in the lower section of Subdistrict 1-B for 8 hours.

EO Number: 3-S-WB-07-14

Effective Date: July 18 and July 21, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for two 12 hour periods.

EO Number: 3-S-WR-17-14

Effective Date: July 21, 2014; 12:00 PM–6:00 PM

Subdistrict 1-B, Commercial fishing will open for 6 hours.

EO Number: 3-S-WB-08-14

Effective Date: July 23 and July 25, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for two 12 hour periods.

EO Number: 3-S-WR-18-14

Effective Date: August 4–August 31, 2014; 3:00 AM–12:00 PM

Kuskokwim River drainage, remaining subsistence fishing restrictions are rescinded.

EO Number: 3-S-WB-09-14

Effective Date: August 4, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for 12 hours.

EO Number: 3-S-WB-10-14

Effective Date: August 6, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for 12 hours.

EO Number: 3-S-WB-11-14
Effective Date: August 8, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for 12 hours.

EO Number: 3-S-WR-19-14

Effective Date: August 11, 2014; 12:00 PM–6:00 PM

Subdistrict 1-B, Commercial fishing will open for 6 hours.

-continued-

EO Number: 3-S-WB-12-14

Effective Date: August 11, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for 12 hours.

EO Number: 3-S-WB-13-14

Effective Date: August 13, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for 12 hours.

EO Number: 3-S-WR-20-14

Effective Date: August 14, 2014; 10:00 AM–6:00 PM

Subdistrict 1-B, Commercial fishing will open in the upper section of Subdistrict 1-B for 6 hours. Commercial fishing will open in the lower section of Subdistrict 1-B for 8 hours.

EO Number: 3-S-WB-14-14

Effective Date: August 15, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for 12 hours.

EO Number: 3-S-WR-21-14

Effective Date: August 18, 2014; 10:00 AM–6:00 PM

Subdistrict 1-B, Commercial fishing will open in the upper section of Subdistrict 1-B for 6 hours. Commercial fishing will open in the lower section of Subdistrict 1-B for 8 hours.

EO Number: 3-S-WB-15-14

Effective Date: August 18, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for 12 hours.

EO Number: 3-S-WR-22-14

Effective Date: August 21, 2014; 10:00 AM–6:00 PM

Subdistrict 1-B, Commercial fishing will open in the upper section of Subdistrict 1-B for 6 hours. Commercial fishing will open in the lower section of Subdistrict 1-B for 8 hours.

EO Number: 3-S-WB-16-14

Effective Date: August 22, 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for 12 hours.

EO Number: 3-S-WR-23-14

Effective Date: August 26, 2014; 10:00 AM–6:00 PM

Subdistrict 1-B, Commercial fishing will open in the upper section of Subdistrict 1-B for 6 hours. Commercial fishing will open in the lower section of Subdistrict 1-B for 8 hours.

EO Number: 3-S-WB-17-14

Effective Date: August 25–August 27 2014; 9:00 AM–9:00 PM

Districts W-4 and W-5, Commercial salmon fishing is open for two 12 hour periods.

Appendix A13.–Estimated subsistence salmon harvest by species and community for the Kuskokwim Area, 2014.

	Households (HH)			Chinook		
Community	Total *N*	Total *n*	% survey	Avg harvest/HH	Est. total harvest	CI (95%)
Kongiganak	90	0	0%	10.7	964	288
N. Kuskokwim Bay	90	0	0%	10.7	964	288
Tuntutuliak	90	1	1%	6.4	574	174
Eek	87	48	55%	7.6	665	266
Kasigluk	103	54	52%	2.0	205	47
Nunapitchuk	121	78	64%	2.4	287	53
Atmautluak	66	45	68%	1.6	108	29
Napakiak	93	55	59%	3.3	311	104
Napaskiak	99	60	61%	4.3	422	94
Oscarville	15	13	87%	4.5	68	20
Bethel	2,051	574	28%	1.5	3,089	1,000
Kwethluk	174	108	62%	5.5	959	286
Akiachak	153	97	63%	6.8	1,033	246
Akiak	83	59	71%	6.4	530	211
Tuluksak	95	63	66%	4.3	404	245
Lower Kuskokwim	3,230	1,255	39%	2.7	8,655	1,172
Lower Kalskag	75	47	63%	3.8	283	232
Upper Kalskag	63	44	70%	4.1	258	76
Aniak	184	163	89%	1.9	344	60
Chuathbaluk	33	27	82%	2.7	90	46
Middle Kuskokwim	355	281	79%	2.7	975	256
Crooked Creek	33	25	76%	1.1	35	14
Red Devil	9	5	56%	9.2	83	0
Sleetmute	38	30	79%	1.5	58	41
Stony River	15	13	87%	1.6	24	23
Lime Village [a]	14	0	0%	2.3	32	75
McGrath	114	56	49%	1.5	173	189
Takotna [b]	23	0	0%	0.0	0	116
Nikolai	36	31	86%	6.5	235	63
Telida	2	–	–	–	–	–
Upper Kuskokwim	284	160	56%	2.3	640	247
Kuskokwim River total	3,959	1,696	43%	2.8	11,234	1,258
Quinhagak	177	112	63%	21.0	3,723	604
Goodnews Bay	72	38	53%	6.0	431	171
Platinum	21	16	76%	2.2	46	27
S. Kuskokwim Bay	270	166	61%	15.6	4,200	628
Total	4,229	1,862	44%	3.6	15,434	1,406

-continued-

Appendix A13.–Page 2 of 3.

Community	Chum			Sockeye		
	Avg harvest/HH	Est. total harvest	CI (95%)	Avg harvest/HH	Est. total harvest	CI (95%)
Kongiganak	21.3	1,915	176	13.7	1,230	191
N. Kuskokwim Bay	21.3	1,915	176	13.7	1,230	191
Tuntutuliak	33.0	2,967	335	19.7	1,774	181
Eek	13.6	1,182	437	16.7	1,450	547
Kasigluk	35.1	3,612	771	19.3	1,990	627
Nunapitchuk	43.1	5,213	767	17.0	2,059	258
Atmautluak	50.4	3,327	1,077	23.2	1,531	442
Napakiak	25.7	2,392	513	16.9	1,573	558
Napaskiak	32.0	3,171	1,051	25.4	2,514	632
Oscarville	39.9	599	25	45.3	679	89
Bethel	8.8	18,017	4,400	7.2	14,828	2,911
Kwethluk	24.8	4,318	997	34.0	5,921	1,566
Akiachak	31.0	4,744	496	19.9	3,047	413
Akiak	35.9	2,982	733	29.1	2,418	639
Tuluksak	23.9	2,274	790	6.5	622	184
Lower Kuskokwim	17.0	54,798	5,077	12.5	40,406	3,639
Lower Kalskag	19.4	1,458	437	13.9	1,040	392
Upper Kalskag	16.5	1,038	252	13.3	839	256
Aniak	25.5	4,695	1,107	8.6	1,578	275
Chuathbaluk	24.4	805	380	14.6	481	257
Middle Kuskokwim	22.5	7,996	1,274	11.1	3,938	601
Crooked Creek	54.6	1,803	92	11.8	391	140
Red Devil	109.0	981	0	16.8	151	0
Sleetmute	14.3	542	125	14.2	541	245
Stony River	1.8	27	67	9.1	137	48
Lime Village [a]	64.9	909	103	63	888	64
McGrath	5.2	598	486	4.0	451	320
Takotna [b]	0.0	12	81	0.0	3	55
Nikolai	14.3	513	99	6.6	236	22
Telida	–	–	–	–	–	–
Upper Kuskokwim	19.0	5,386	540	9.9	2,798	438
Kuskokwim River total	17.7	70,094	5,265	12.2	48,372	3,719
Quinhagak	11.1	1,958	348	7.7	1,370	472
Goodnews Bay	2.1	153	209	4.8	349	523
Platinum	4.3	90	19	221.8	4,658	88
S. Kuskokwim Bay	8.2	2,201	406	23.6	6,377	710
Total	17.1	72,295	5,281	12.9	54,749	3,787

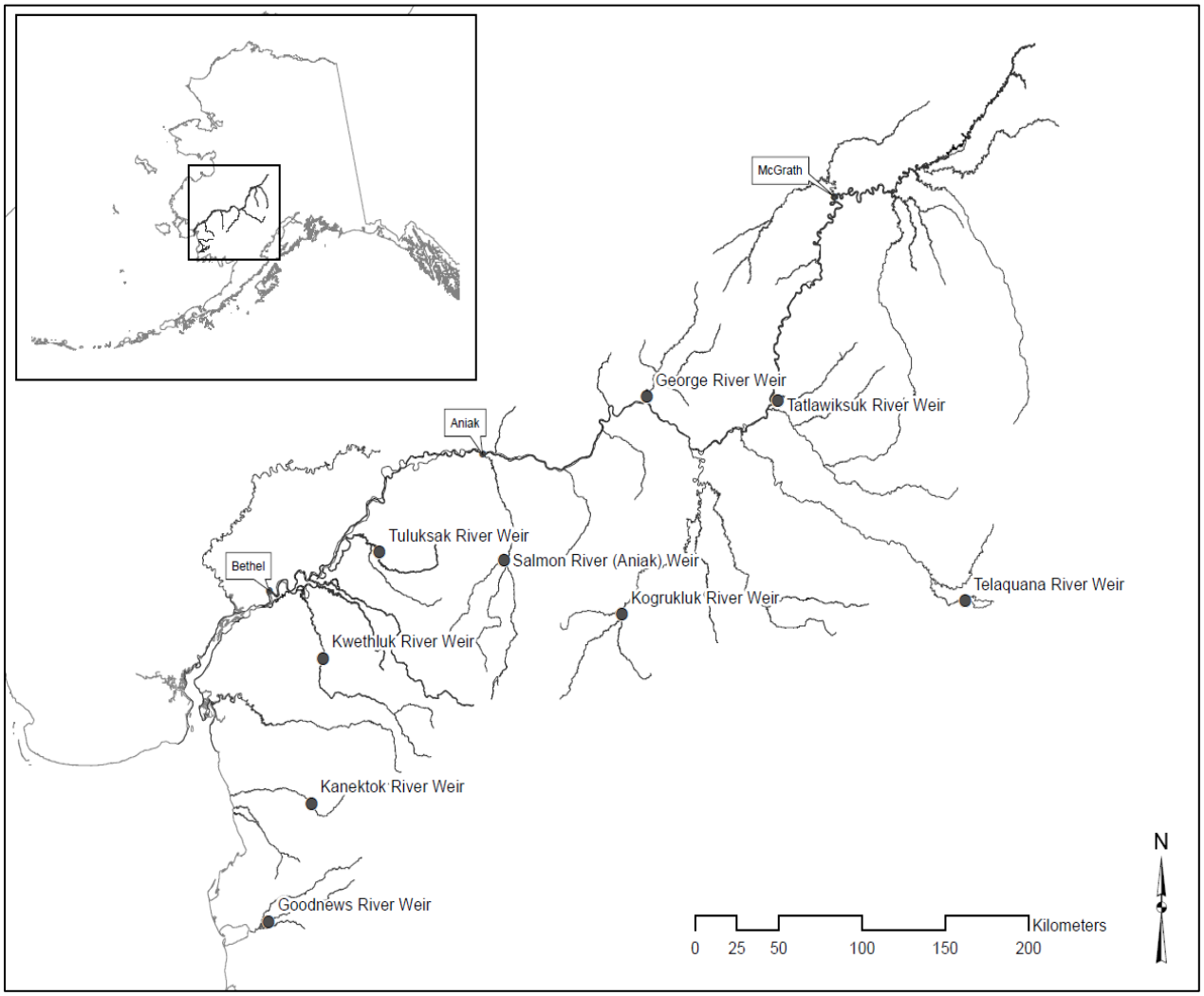
-continued-

Community	Coho			Pink		
	Avg harvest/HH	Est. total harvest	CI (95%)	Avg harvst/HH	Est. total harvest	CI (95%)
Kongiganak	6.2	561	180	–	–	–
N. Kuskokwim Bay	6.2	561	180	–	–	–
Tuntutuliak	8.8	794	215	–	–	–
Eek	6.4	555	248	0.2	15	16
Kasigluk	8.3	851	444	0.1	12	11
Nunapitchuk	10.8	1,305	247	0.3	42	21
Atmautluak	2.7	176	49	0.9	62	64
Napakiak	8.0	740	191	0.5	51	34
Napaskiak	11.6	1,153	284	0.2	20	21
Oscarville	8.5	128	27	1.6	24	0
Bethel	9.4	19,364	3,824	0.5	1,048	430
Kwethluk	25.4	4,422	716	0.7	125	99
Akiachak	12.1	1,845	381	0.8	123	61
Akiak	18.1	1,501	680	3.4	282	181
Tuluksak	8.5	808	368	0.3	30	27
Lower Kuskokwim	10.4	33,642	4,045	0.6	1,834	488
Lower Kalskag	12.1	907	299	0.4	30	16
Upper Kalskag	14.9	938	280	0.4	24	6
Aniak	52.0	9,566	4,133	3.5	636	422
Chuathbaluk	8.8	291	138	0.0	0	0
Middle Kuskokwim	33.0	11,702	4,156	1.9	690	422
Crooked Creek	6.0	198	101	-	1	1
Red Devil	88.0	792	0	0.6	5	0
Sleetmute	26.1	993	140	0.0	0	0
Stony River	11.8	177	55	0.3	4	3
Lime Village [a]	16	226	53	–	–	–
McGrath	10.4	1,189	558	0.1	15	21
Takotna [b]	0.0	0	79	–	–	–
Nikolai	7.1	256	27	0.1	2	0
Telida	–	–	–	–	–	–
Upper Kuskokwim	13.5	3,831	595	0.1	27	21
Kuskokwim River total	12.6	49,736	5,833	0.6	2,551	646
Quinhagak	12.7	2,240	350	0.2	40	18
Goodnews Bay	5.2	371	182	0.0	0	0
Platinum	11.4	240	81	1.4	29	20
S. Kuskokwim Bay	10.6	2,851	403	0.3	69	27
Total	12.4	52,587	5,847	0.6	2,620	647

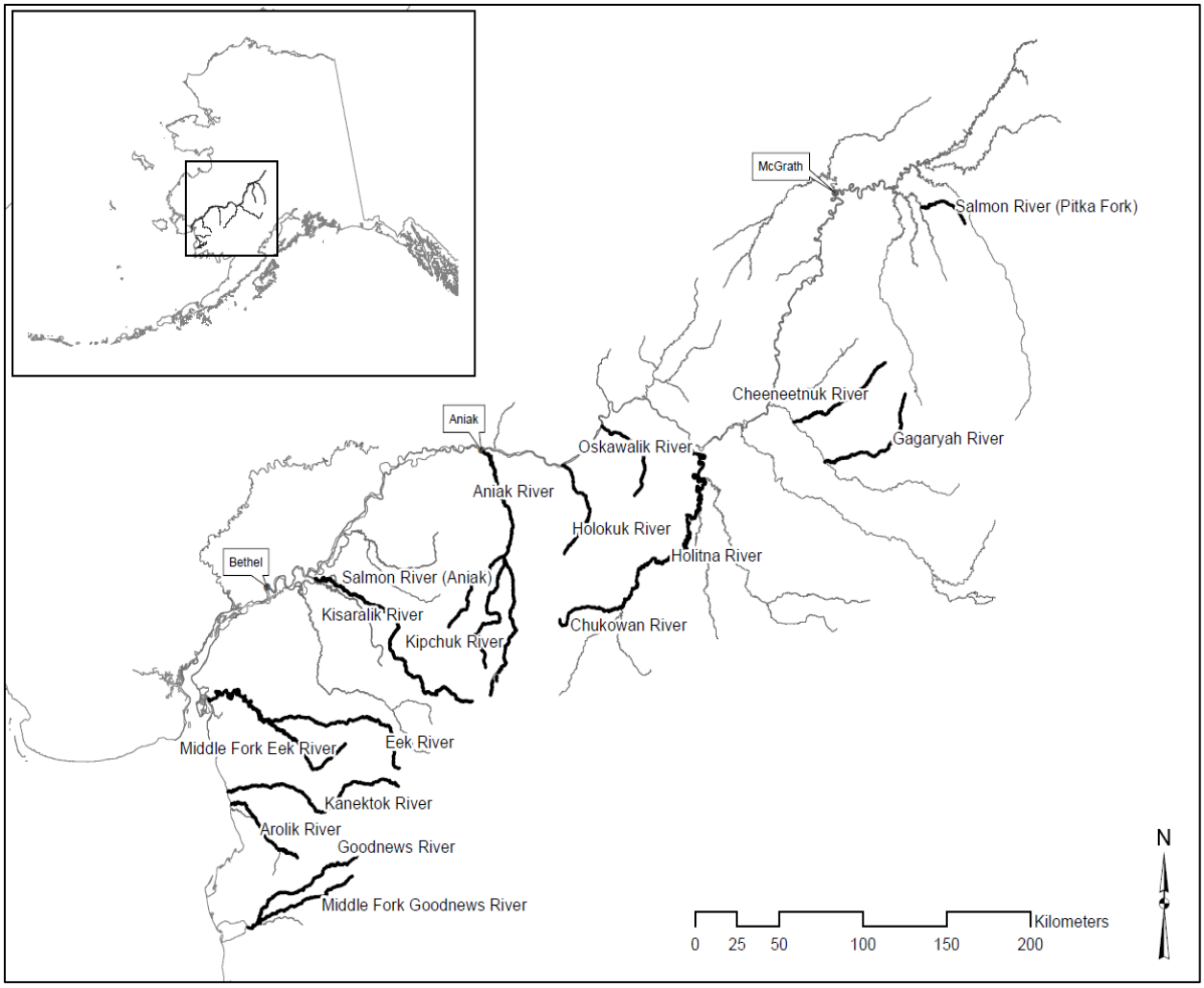
Note: *N* is the total number of households, *n* is the number of households surveyed; Kuskokwim River total includes Lower, Middle, and Upper Kuskokwim areas and North Kuskokwim Bay. Preliminary estimated subsistence harvest and the data are subject to change.

[a] These villages were not surveyed, therefore the total harvest is estimated using historical average household harvest expanded by the number of households.

[b] Takotna is not surveyed, but harvest is estimated to be 0 based on harvest practices. Data are unavailable for cells with a dash. Bayesian estimation method is not possible for these communities. Pink salmon have little to no historical data.

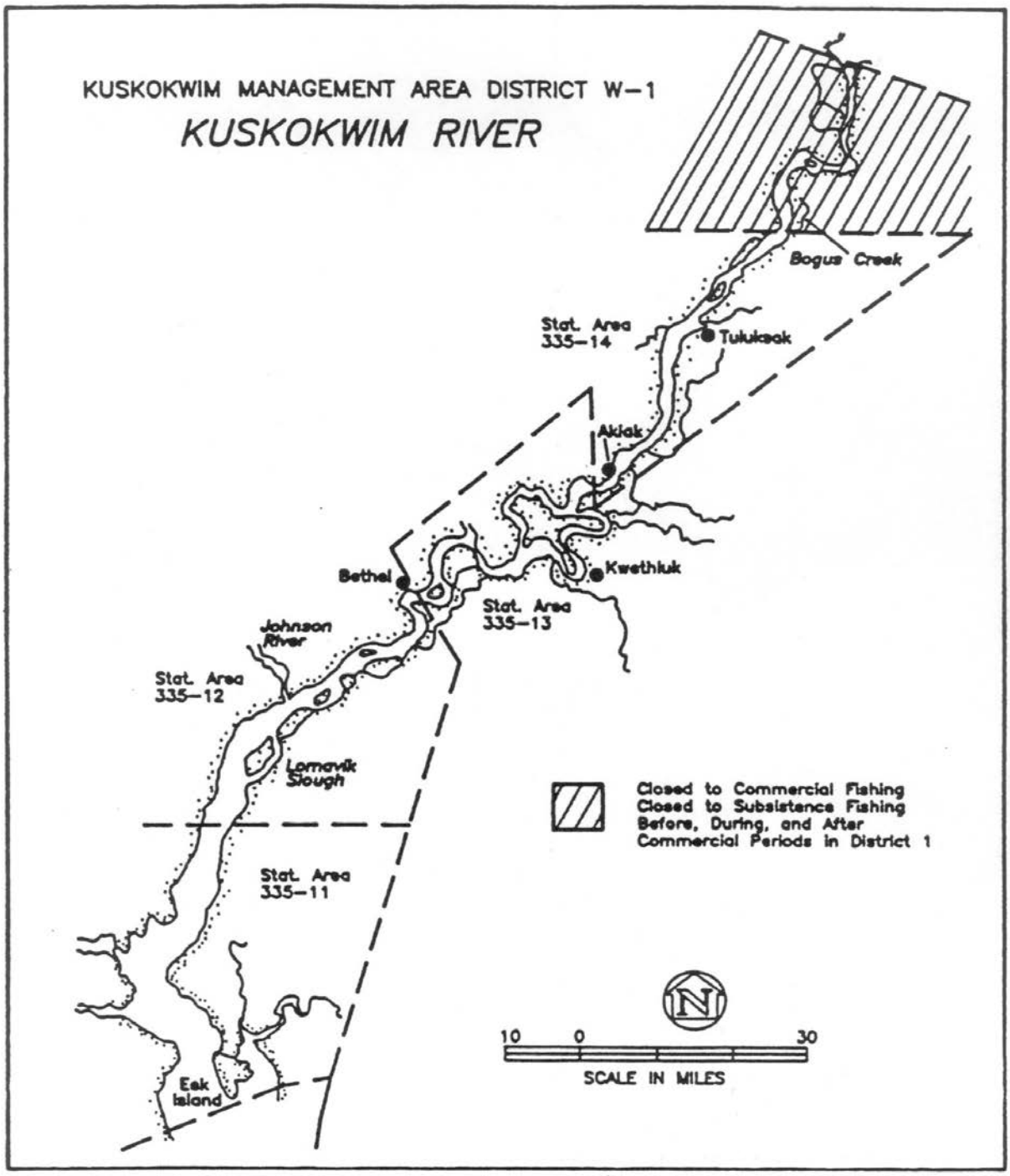


Appendix A14.–Kuskokwim Management Area weir locations.

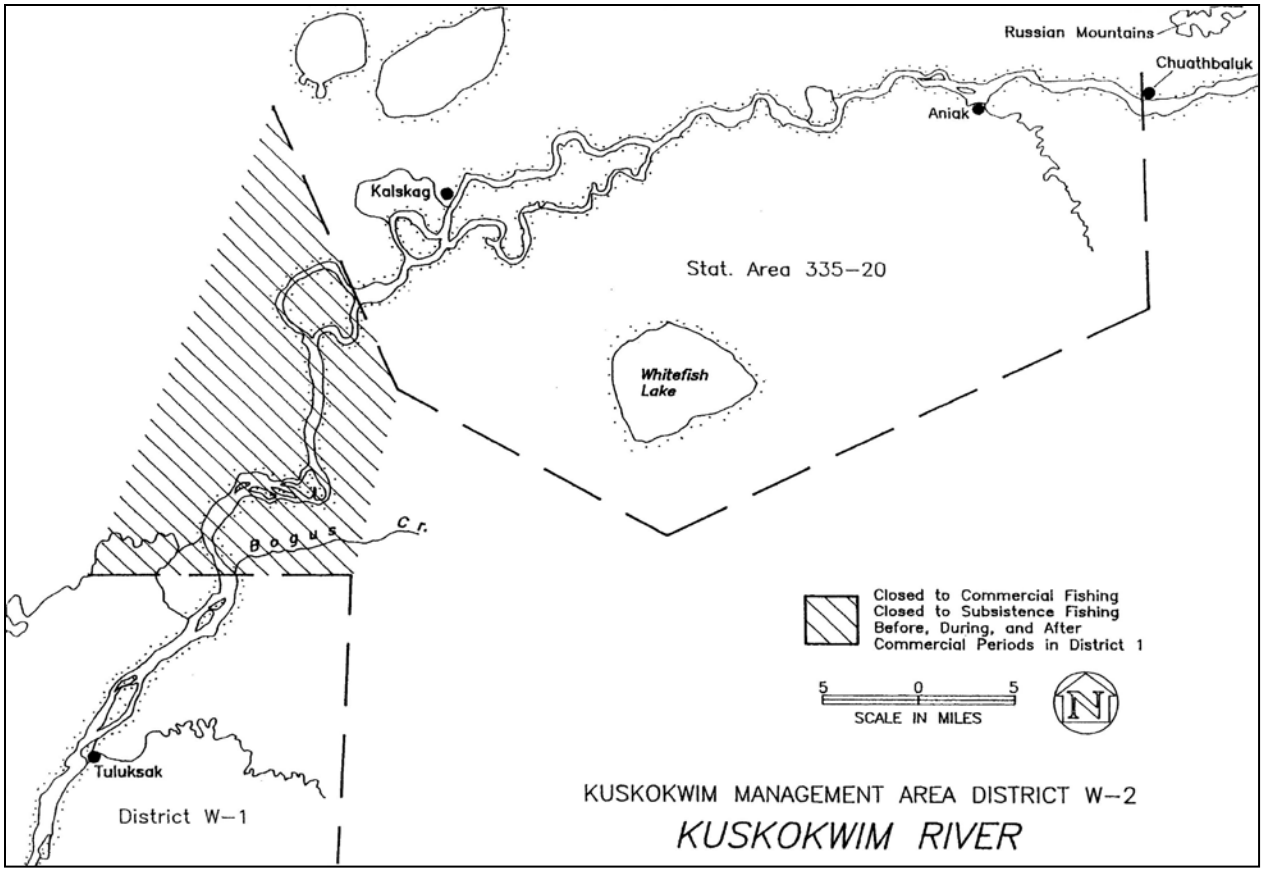


Appendix A15.–Map of aerial survey streams, Kuskokwim Management Area.

APPENDIX B



Appendix B1.–Map of Commercial Fishing District W-1, Kuskokwim River, Kuskokwim Management Area.



Appendix B2.–Map of Commercial Fishing District W-2, Kuskokwim River, Kuskokwim Management Area.

Appendix B3.–Districts 1 and 2 combined commercial salmon harvests, including personal use, Kuskokwim River, 1960–2014.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960[a]	5,969	0	2,498	0	0	8,467
1961[a]	18,918	0	5,044	0	0	23,962
1962[a]	15,341	0	12,432	0	0	27,773
1963[a]	12,016	0	15,660	0	0	27,676
1964[a]	17,149	0	28,613	0	0	45,762
1965[a]	21,989	0	12,191	0	0	34,180
1966	25,545	0	22,985	0	0	48,530
1967	29,986	0	56,313	0	148	86,447
1968	34,278	0	127,306	0	187	161,771
1969	43,997	322	83,765	0	7,165	135,249
1970	39,290	117	38,601	44	1,664	79,716
1971	40,274	2,606	5,253	0	68,914	117,047
1972	39,454	102	22,579	8	78,619	140,762
1973	32,838	369	130,876	33	148,746	312,862
1974	18,664	136	147,269	84	171,887	338,040
1975	22,135	23	81,945	10	184,171	288,284
1976	30,735	2,971	88,501	133	177,864	300,204
1977	35,830	9,379	241,364	203	248,721	535,497
1978	45,641	733	213,393	5,832	248,656	514,255
1979	38,966	1,054	219,060	78	261,874	521,032
1980	35,881	360	222,012	803	483,211	742,267
1981	47,663	48,375	211,251	292	418,677	726,258
1982	48,234	33,154	447,117	1,748	278,306	808,559
1983	33,174	68,855	196,287	211	276,698	575,225
1984	31,742	48,575	623,447	2,942	423,718	1,130,424
1985	37,889	106,647	335,606	75	199,478	679,695
1986	19,414	95,433	659,988	3,422	309,213	1,087,470
1987	36,179	136,602	399,467	43	574,336	1,146,627
1988	55,716	92,025	524,296	10,825	1,381,674	2,064,536
1989	43,217	42,747	479,856	464	749,182	1,315,466
1990	53,502	84,414	409,053	3,397	459,974	1,010,340
1991	37,778	108,946	500,935	378	431,802	1,079,839
1992	46,872	92,218	666,170	7,451	344,603	1,157,314
1993	8,735	27,008	610,739	64	43,337	689,883
1994	16,211	49,365	724,689	30,949	271,115	1,092,329
1995	30,846	92,500	471,461	93	605,918	1,200,818
1996	7,419	33,878	937,299	1,621	207,877	1,188,094
1997	10,441	21,989	130,803	2	17,026	180,261
1998	17,359	60,906	210,481	92	207,809	496,647
1999	4,705	16,976	23,593	2	23,006	68,282
2000	444	4,130	261,379	7	11,570	277,530
2001	90	84	192,998	0	1,272	194,444
2002	72	84	83,463	0	1,900	85,519
2003	158	282	284,064	0	2,764	287,268
2004	2,305	8,532	435,407	0	20,150	466,394
2005	4,784	27,645	142,319	0	69,139	243,887

-continued-

Appendix B3.–Page 2 of 2.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
2006	2,777	12,618	185,636	1	44,152	245,184
2007	179	703	141,049	0	10,783	152,714
2008	8,865	15,601	142,877	15	30,798	198,156
2009	6,664	25,673	104,552	18	76,956	213,863
2010	2,732	22,433	58,031	7	93,917	177,120
2011	747	13,497	74,123	2	118,316	206,685
2012	627	2,857	86,394	0	65,195	155,073
2013	174	768	114,069	1	52,236	167,248
2014	35	2,720	117,588	3	19,080	139,426
Average 2004–2013	2,985	13,033	148,446	4	58,164	222,632

[a] Includes harvests from District 3.

Appendix B4.–Commercial salmon harvest and exvessel value, District W-1, Kuskokwim River, Kuskokwim Management Area,1993–2014.

	Chinook		Sockeye		Coho		Pink		Chum		Total	
Year	Number	Value	Number	Value	Number	Value	Number	Value	Number	Value	Number	Value
1993	8,735	$72,659	27,008	$140,000	610,739	$2,535,321	64	$59	43,337	$112,756	689,883	$2,860,795
1994	16,211	$126,892	49,365	$188,691	724,689	$2,875,803	30,930	$8,967	271,115	$381,639	1,092,310	$3,581,992
1995	30,846	$280,287	92,500	$448,530	471,461	$1,313,742	335	$50	605,918	$724,273	1,201,060	$2,766,882
1996	7,419	$23,665	33,878	$97,176	937,299	$1,824,683	1,621	$744	207,877	$170,977	1,188,094	$2,117,245
1997	10,441	$36,843	21,989	$64,922	130,803	$2,167,491	2	$1	17,026	$19,509	180,261	$2,288,766
1998	17,359	$74,387	60,906	$209,860	210,481	$516,024	92	$55	207,809	$183,307	496,647	$983,633
1999	4,705	$22,266	16,976	$86,442	23,593	$44,633	2	$0	23,006	$16,428	68,282	$169,769
2000	444	$3,044	4,130	$14,272	261,379	$489,644	7	$3	11,570	$7,967	277,530	$514,930
2001	90	$534	84	$265	192,998	$422,573	–	$0	1,272	$827	194,444	$424,199
2002	72	$212	84	$196	83,463	$124,763	–	$0	1,900	$1,190	85,519	$126,361
2003	158	$846	282	$803	284,064	$450,451	–	$0	2,764	$1,087	287,268	$453,187
2004	2,305	$9,815	8,532	$19,549	435,407	$907,791	–	$0	20,150	$6,611	466,394	$943,766
2005	4,784	$29,040	27,645	$109,063	142,319	$287,635	–	$0	69,139	$23,115	243,887	$448,853
2006	2,777	$16,192	12,618	$41,891	185,598	$378,318	1	$1	44,070	$14,988	245,064	$451,390
2007	179	$1,607	703	$2,411	141,049	$373,789	–	$0	10,763	$3,033	152,694	$380,840
2008	8,865	$70,988	15,601	$59,777	142,862	$396,329	15	$4	30,516	$11,212	197,859	$538,310
2009	6,664	$61,452	25,673	$101,445	104,546	$263,457	2	$0	76,790	$76,494	213,675	$502,848
2010	2,731	$53,134	22,428	$167,575	58,031	$382,452	–	$0	93,148	$162,445	176,338	$765,606
2011	49	$411	13,482	$79,370	74,108	$334,452	1	$0	118,256	$350,124	205,896	$764,357
2012	14	$225	2,857	$16,154	86,389	$323,687	–	$0	65,171	$257,932	154,431	$597,998
2013	1	$6	768	$5,226	114,069	$833,327	–	$0	52,236	$346,288	167,074	$1,184,847
2014	–	$–	2,720	$19,943	117,588	$751,850	3	$0	19,080	$71,563	139,391	$843,356
Average 2004–2013	2,837	$24,287	13,031	$60,246	148,438	$448,124	2	$0	58,024	$125,224	222,331	$657,881

Appendix B5.–Chinook salmon utilization, Kuskokwim River, Kuskokwim Area, 1990–2014.

Year	Estimated total run	Estimated escapement	Harvest				
			Subsistence	Commercial[a]	Sport	Test fish	Total
1990	264,802	100,614	109,778	53,504	394	257	163,933
1991	218,705	105,589	74,820	37,778	401	149	113,148
1992	284,846	153,573	82,654	46,872	367	518	130,411
1993	269,305	169,816	87,674	8,735	587	2,515	99,511
1994	365,246	242,616	103,343	16,211	1,139	1,850	122,543
1995	360,513	225,595	102,110	30,846	541	1,001	134,498
1996	302,603	197,092	96,413	7,419	1,432	247	105,511
1997	303,189	211,247	79,381	10,441	1,227	332	91,381
1998	213,873	113,627	81,213	17,359	1,434	210	100,216
1999	189,939	112,082	72,775	4,705	252	98	77,830
2000	136,618	65,180	67,620	444	105	60	68,229
2001	223,707	145,232	78,009	90	290	–	78,389
2002	246,296	164,635	80,982	72	319	–	81,373
2003	248,789	180,687	67,134	158	401	–	67,693
2004	388,136	287,178	96,788	2,305	857	19	99,969
2005	366,601	275,598	85,863	4,784	572	2	91,221
2006	307,662	214,004	90,812	2,777	444	–	94,033
2007	273,060	174,943	94,898	179	1,478	–	96,555
2008	237,074	128,978	88,912	8,865	708	–	98,485
2009	204,747	118,478	79,896	6,664	904	–	87,464
2010	118,507	49,073	67,286	2,732	354	–	70,372
2011	133,059	72,097	62,366	747	579	–	63,692
2012	99,807	76,074	22,544	627	–	–	23,171
2013	94,166	47,315	47,113	174	–	–	47,287
2014	135,749	123,987	11,234	35	–	–	11,269
10-year avg (2005–2014)	197,043	128,055	65,092	2,758	504	0	68,355

Note: Dashes indicate no data.

[a] Does not include fish retained for personal use.

Appendix B6.–Sockeye salmon utilization, Kuskokwim River, Kuskokwim Area, 1990−2014.

	Harvest				
Year	Commercial [a]	Subsistence	Test fish [b]	Sport fish	Total
1990	84,414 [c]	45,897	456	61	130,828
1991	108,946 [c]	47,370	383	38	156,737
1992	92,218 [c]	43,514	1,264	131	137,127
1993	27,008 [c]	51,616	4,706	348	83,678
1994	49,365 [c]	42,362	2,561	359	94,647
1995	92,500 [c]	30,905	1,992	95	125,492
1996	33,878 [c]	40,591	623	315	75,407
1997	21,989 [c]	38,744	584	423	61,740
1998	60,906	36,103	625	178	97,812
1999	16,976	47,360	562	54	64,952
2000	4,130	45,942	410	46	50,528
2001	84	53,245	510	231	54,070
2002	84	32,296	0	42	32,422
2003	282	32,241	0	140	32,663
2004	8,532 [c]	39,127	44	400	48,103
2005	27,645 [c]	41,885	7	636	70,173
2006	12,618 [c]	43,577	0	231	56,426
2007	703 [c]	46,817	4	322	47,846
2008	15,601 [c]	52,213	0	273	68,087
2009	25,673 [c]	35,747	0	162	61,582
2010	22,428 [c]	38,735	0	419	61,582
2011	13,482 [c]	43,245	0	98	56,825
2012	2,857 [c]	47,396	1	132	50,386
2013	768 [c]	39,382	0	85	40,235
2014	2,720 [c]	48,372	0	–	51,092
Average 2004–2013	13,031	42,812	6	276	56,125

[a] Not including personal use.

[b] Test fishery sales only, does not include donations.

[c] Districts 1 and 2.

Appendix B7.–Coho salmon utilization, Kuskokwim River, Kuskokwim Management Area, 1990−2014.

Year	Harvest				
	Commercial [a]	Subsistence	Test fish [b]	Sport fish	Total
1990	409,053 [c]	57,560	1,279	581	468,473
1991	500,935 [c]	39,252	1,188	1,003	542,378
1992	666,170 [c]	52,299	10,109	1,692	730,270
1993	610,739 [c]	28,485	8,084	980	648,288
1994	724,689 [c]	36,609	7,854	1,925	771,077
1995	471,461 [c]	36,823	6,620	1,497	516,401
1996	937,299 [c]	43,173	3,013	3,423	986,908
1997	130,803 [c]	29,816	1,103	2,408	164,130
1998	210,481 [c]	24,667	607	2,419	238,174
1999	23,593	27,409	343	1,998	53,343
2000	261,379 [c]	42,341	2,818	1,689	308,227
2001	192,998	31,089	1,530	1,204	226,821
2002	83,463	42,602	680	2,030	128,775
2003	284,064	33,259	570	3,244	321,137
2004	435,407 [c]	45,450	464	4,996	486,317
2005	142,319 [c]	32,755	454	3,539	179,067
2006	185,598 [c]	41,175	169	1,474	228,416
2007	141,049 [c]	33,766	446	2,355	177,616
2008	142,862 [c]	44,724	0	3,755	191,341
2009	104,546 [c]	29,767	0	3,257	137,570
2010	58,031 [c]	33,580	0	1,482	93,093
2011	74,108 [c]	32,172	0	896	107,176
2012	86,389 [c]	28,200	151	974	115,714
2013	114,069 [c]	26,409	0	1,147	141,625
2014	117,588 [c]	49,736	0	–	167,324
Average 2004–2013	148,438	34,800	168	2,388	185,794

[a] Not including personal use.

[b] Test fishery sales only, does not include donations.

[c] Districts 1 and 2.

Appendix B8.–Chum salmon utilization, Kuskokwim River, Kuskokwim Area, 1990–2014.

Year	Harvest				
	Commercial [a]	Subsistence	Test fish [b]	Sport fish	Total
1990	459,974 [c]	153,825	1,650	533	615,982
1991	431,802 [c]	87,237	1,014	378	520,431
1992	344,603 [c]	116,391	12,409	608	474,011
1993	43,337 [c]	59,797	8,365	359	111,858
1994	271,115 [c]	76,937	11,637	1,280	360,969
1995	605,918 [c]	70,977	16,241	226	693,362
1996	207,877 [c]	100,913	2,864	280	311,934
1997	17,026 [c]	37,366	790	86	55,268
1998	207,809 [c]	61,732	1,140	291	270,972
1999	23,006	44,242	363	180	67,791
2000	11,570	56,499	1,033	26	69,128
2001	1,272	56,005	19	112	57,408
2002	1,900	86,381	7	53	88,341
2003	2,764	41,167	0	53	43,984
2004	20,150 [c]	64,140	113	84	84,487
2005	69,139 [c]	58,555	96	500	128,290
2006	44,152 [c]	89,674	0	13	133,839
2007	10,783 [c]	73,560	53	391	84,787
2008	30,798 [c]	63,789	0	121	94,708
2009	76,956 [c]	44,324	0	285	121,565
2010	93,917 [c]	45,089	0	85	139,091
2011	118,316 [c]	54,316	0	83	172,715
2012	65,195 [c]	79,631	93	80	144,999
2013	52,236 [c]	53,627	0	31	105,894
2014	19,080 [c]	68,398	0	–	87,478
Average 2004–2013	58,164	62,671	36	167	121,038

[a] Not including personal use.

[b] Test fishery sales only, does not include donations.

[c] Districts 1 and 2.

Appendix B9.–Bethel test fishery harvest donations and sales, Kuskokwim River, Kuskokwim Management Area, 1990−2014.

	Chinook			Sockeye			Coho			Chum		
Year	Donated [a]	Sales [b]	Total	Donated [a]	Sales [b]	Total	Donated [a]	Sales [b]	Total	Donated [a]	Sales [b]	Total
1990[c]	255	257	512	–	456	–		1,279	–	457	1,650	2,107
1991	0	149	149	–	383	–		1,188	–	0	1,014	1,014
1992[d]	862	518	1,380	–	1,264	–		10,109	–	2,921	12,409	15,330
1993[d]	0	2,515	2,515	–	4,706	–		8,084	–	86	8,365	8,451
1994[d]	87	1,850	1,937	–	2,561	–		7,854	–	361	11,637	11,998
1995[d]	420	1,001	1,421	–	1,992	–		6,620	–	1,232	16,241	17,473
1996	0	247	247	–	623	–		3,013	–	0	2,864	2,864
1997	0	332	332	–	584	–		1,103	–	0	790	790
1998	0	210	210	–	625	–		607	–	0	1,140	1,140
1999	0	98	98	–	562	–	0	343	343	199	363	562
2000	4	60	64	–	410	–	10	2,818	2,828	5	1,033	1,038
2001	86	0	86	0	510	510	193	1,530	1,723	1,724	19	1,743
2002	288	0	288	228	0	228	1,804	680	2,484	2,659	7	2,666
2003	409	0	409	646	0	646	1,807	570	2,377	1,713	0	1,713
2004	672	19	691	698	44	742	1,795	464	2,259	1,697	113	1,810
2005	555	2	557	1,055	7	1,062	1,045	454	1,499	4,363	96	4,459
2006	352	0	352	519	0	519	1,017	169	1,186	3,547	0	3,547
2007	305	0	305	484	4	488	1,111	446	1,557	3,184	53	3,237
2008	420	0	420	584	0	584	2,954	0	2,954	2,472	0	2,472
2009	470	0	470	515	0	515	2,394	0	2,394	2,746	0	2,746
2010	292	0	292	495	0	495	1,020	0	1,020	2,872	0	2,872
2011	337	0	337	380	0	380	1,207	0	1,207	2,289	0	2,289
2012	321	0	321	398	1	399	1,104	151	1,255	2,637	93	2,730
2013	201	0	201	462	0	462	1,767	0	1,767	2,615	0	2,615
2014	497	0	497	3,221	0	3,221	2,880	0	2,880	2,549	0	2,549
Average 2004–2013	393	2	395	559	6	565	1,541	168	1,710	2,842	36	2,878

Note: Dashes indicate that no information is available.

[a] Test fishery donations are included in postseason subsistence salmon harvest survey estimates.

[b] Test fishery sales are not included in commercial harvest.

[c] Includes Eek test fishery.

[d] Includes Eek and Aniak test fisheries.

Appendix B10.–Commercial salmon harvest by period, District W-1, Kuskokwim River, Kuskokwim Management Area, 2014.

Date	Permits	Landings	Subdistrict	Number of Salmon				
				Chinook[a]	Sockeye	Coho	Chum	Total
Jul 14	146	147 [b]	1-B	0	1,063	0	7,491	8,554
Jul 18	166	169 [b]	1-B	0	849	1,919	7,379	10,147
Jul 21	159	160 [b]	1-B	0	624	3,496	3,930	8,050
Aug 11	187	201 [b]	1-B	0	116	23,999	171	24,286
Aug 14	251	262 [b]	1-B	0	25	32,570	31	32,626
Aug 18	245	269 [b]	1-B	0	9	26,395	22	26,426
Aug 21	243	247 [b]	1-B	0	20	18,809	35	18,864
Aug 26	188	191 [b]	1-B	0	14	10,400	21	10,435
Total	358	1,646		0	2,720	117,588	19,080	139,388

[a] Coastal Villages Seafood did not purchase Chinook salmon in 2014 and 35 Chinook salmon were harvested during commercial openings, but were retained for personal use.

[b] Two hours of additional fishing time was allowed in Lower Section of W1-B.

Appendix B11.–Chinook salmon escapements at weir projects, Kuskokwim River, Kuskokwim Management Area, 2003–2014.

	Chinook salmon escapement						
Year	Kwethluk	Tuluksak	George	Kogrukluk	Tatlawiksuk	Takotna	Salmon
2003	14,474	1,064	[a]	12,008	[a]	378	[b]
2004	28,605	1,475	5,488	19,819	2,833	461	[b]
2005	[b]	2,653	3,845	21,819	2,864	499	[b]
2006	17,619	1,043	4,355	20,205	1,700	539	7,075
2007	12,927	374	4,011	[a]	2,032	418	6,255
2008	5,276	701	2,563	9,750	1,075	413	2,376
2009	5,744	362	3,663	9,528	1,071	311	1,656
2010	1,668	201	1,498	5,812	546	178	[b]
2011	4,079	284	1,547	6,731	992	134	[b]
2012	[b]	560	2,201	[a]	1,116	228	[a]
2013	[b]	193	1,292	1,819	495	94	625
2014	3,187	320	2,993	3,732	1,904	[b]	1,757
SEG	4,100–7,500		1,800–3,300	4,800–8,800			
Average 2004–2013	10,845	785	3,046	11,935	1,472	328	3,597

[a] Weir did not operate or counts were incomplete.

[b] Historical run timing indicates that more than 40% of the run was missed; annual escapement was not determined.

Appendix B12.–Sockeye salmon escapements at weir projects, Kuskokwim River, Kuskokwim Management Area, 2003–2014.

Year	Sockeye salmon escapement							
	Kwethluk	Tuluksak	George	Kogrukluk	Tatlawiksuk	Takotna	Telaquana	Salmon
2003	2,928	288	14	9,302	[a]	3	[a]	[a]
2004	3,490	136	177	6,895	10	17	[a]	[a]
2005	[a]	642	272	37,787	74	34	[a]	[a]
2006	6,733	985	146	61,382	38	59	[a]	7,086
2007	5,262	352	65	17,211	25	13	[a]	2,189
2008	2,451	188	92	19,675	39	12	[a]	1,181
2009	4,230	686	54	22,826	39	3	[a]	1,366
2010	4,239	437	113	17,139	28	8	71,932	[a]
2011	2,031	126	43	7,974	15	1	35,102	[a]
2012	[a]	187	79	[b]	9	0	23,005	924
2013	[a]	394	150	7,808	37	0	28,050	966
2014	3,776	514	156	6,413	9	[a]	24,293	894
SEG				4,400–17,000				
Average 2004–2013	4,062	413	119	22,077	29	15	36,476	2,285

[a] Weir did not operate or counts were incomplete.

[b] Historical run timing indicates that more than 40% of the run was missed; annual escapement was not determined.

Appendix B13.–Coho salmon escapements at weir projects, Kuskokwim River, Kuskokwim Management Area, 2003–2014.

	Coho salmon escapement						
Year	Kwethluk	Tuluksak	George	Kogrukluk	Tatlawiksuk	Takotna	Salmon
2003	109,163	41,071	32,873	74,915	[a]	7,171	[b]
2004	64,216	20,336	12,499	26,078	16,446	3,207	[b]
2005	[a]	11,324	8,294	25,407	7,076	2,216	[b]
2006	25,664	6,111	12,705	16,268	[a]	5,548	[a]
2007	20,256	2,807	28,398	26,423	8,500	2,853	[a]
2008	49,972	7,457	21,931	29,237	11,022	2,817	10,974
2009	21,911	8,137	12,490	22,289	10,148	2,708	6,351
2010	[a]	1,216	12,639	14,689	3,733	3,217	[b]
2011	[a]	[a]	29,120	21,800	14,184	4,063	[b]
2012	19,960	4,407	14,478	13,421	8,015	1,838	[a]
2013	[a]	6,490	15,308	21,207	12,764	4,149	2,797
2014	43,945	13,672	35,771	52,975	19,814	[a]	8,254
SEG	>19,000			13,000–28,000			
Average 2004–2013	33,663	7,587	16,786	21,682	11,170	3,262	6,707

[a] Weir did not operate or counts were incomplete.

[b] Historical run timing indicates that more than 40% of the run was missed; annual escapement was not determined.

Appendix B14.–Chum salmon escapements at weir projects, Kuskokwim River, Kuskokwim Management Area, 2003–2014.

	Chum salmon escapement							
Year	Kwethluk	Tuluksak	George	Kogrukluk	Tatlawiksuk	Takotna	Aniak	Salmon
2003	41,812	11,725	33,648	23,779	[a]	3,430	477,544	[b]
2004	38,646	11,796	15,012	24,405	21,245	1,633	672,931	[b]
2005	[b]	35,696	14,835	194,887	55,599	6,488	1,151,505	[b]
2006	47,491	25,652	42,318	188,003	32,776	12,729	1,108,626	42,825
2007	54,913	17,286	61,531	52,961	83,484	8,950	696,801	25,340
2008	20,030	12,550	29,396	44,744	30,129	5,704	427,911	9,459
2009	32,191	13,671	7,944	82,483	19,975	2,528	479,531	9,392
2010	19,235	13,042	26,275	69,258	37,737	4,039	429,643	[b]
2011	18,329	9,828	46,650	76,823	88,202	8,822	345,630	[b]
2012	[b]	16,981	33,310	[a]	44,569	6,180	[b]	[a]
2013	[b]	12,911	37,879	65,644	32,249	6,465	[b]	7,723
2014	17,941	8,724	17,148	30,763	12,455	[b]	[b]	2,890
SEG				15,000–49,000			222,000–480,000	
Average 2004–2013	32,976	16,941	31,515	88,801	41,675	6,354	664,072	18,948

[a] Weir did not operate or counts were incomplete.

[b] Historical run timing indicates that more than 40% of the run was missed; annual escapement was not determined.

Appendix B15.–Chinook salmon spawning aerial survey index estimates, Kuskokwim River drainage, Kuskokwim Management Area, 2003–2014.

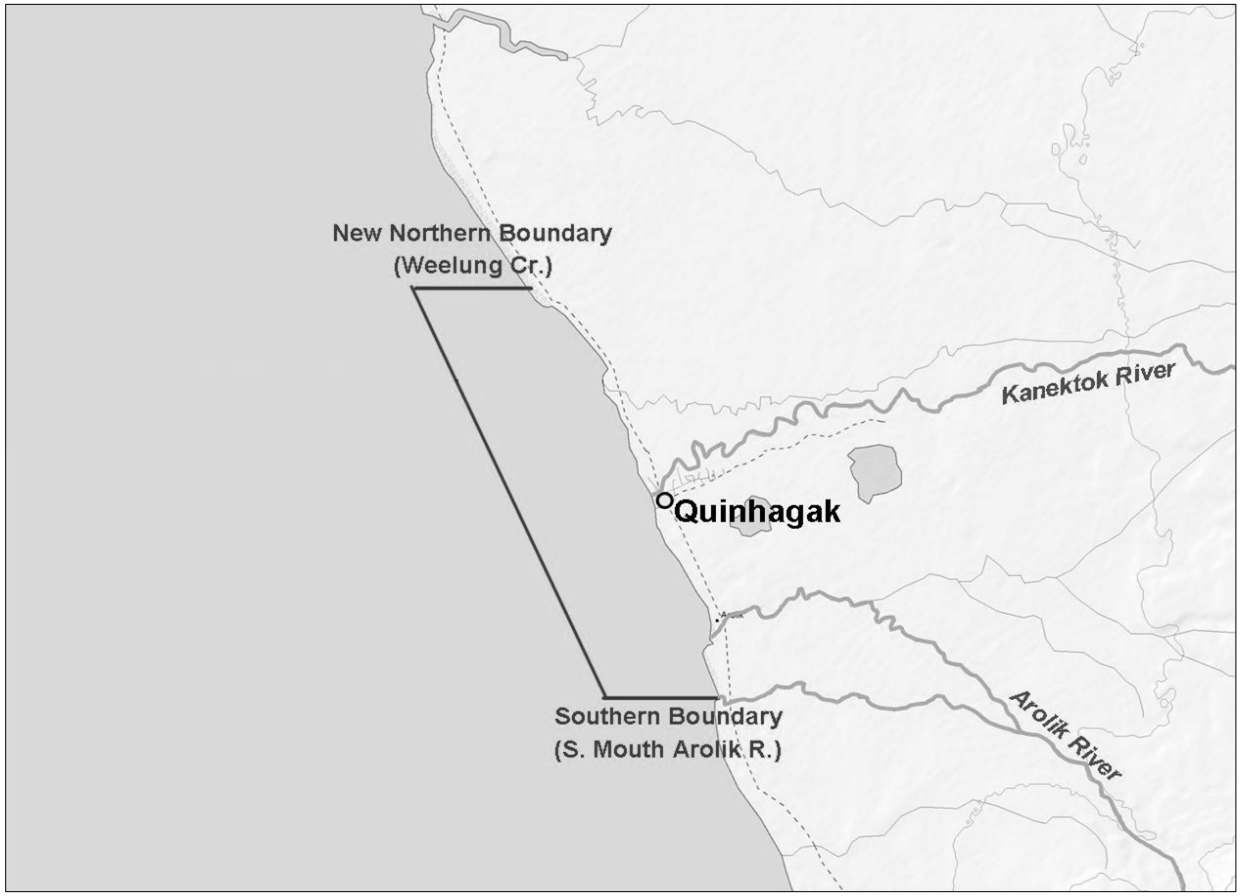
Year[a]	Eek	Kwethluk	Kisaralik	Tuluksak	Aniak	Kipchuk	Salmon (Aniak)	Holokuk	Oskawalik	Holitna	Gagarayah	Cheeneetnuk	Bear (Pitka)	Salmon (Pitka)	Upper Pitka Fork
2003	1,525	2,661	654	94	3,514	1,493	1,242	1,096	844	[b]	1,093	810	176	[b]	197
2004	4,653	6,801	5,157	1,196	5,362	1,868	2,177	539	293	4,051	670	918	206	1,138	290
2005	[b]	5,059	2,206	672	[b]	1,679	4,097	510	582	1,760	[b]	[b]	367	1,801	744
2006	[b]	[b]	4,734	[b]	5,639	1,618	[b]	705	386	1,866	531	1,015	347	862	170
2007	[b]	[b]	692	173	3,984	2,147	1,458	[b]	[b]	[b]	1,035	[b]	165	943	131
2008	[b]	487	1,074	[b]	3,222	1,061	589	418	213	[b]	177	290	245	1,033	248
2009	[b]	[b]	[b]	[b]	[b]	[b]	[b]	565	379	[b]	303	323	209	632	187
2010	[b]	[b]	235	[b]	[b]	[b]	[b]	229	[b]	[b]	62	[b]	75	135	67
2011	263	[b]	[b]	[b]	[b]	116	79	61	26	[b]	96	249	145	767	85
2012	[b]	[b]	588	[b]	[b]	193	49	36	51	[b]	178	229	[b]	670	[b]
2013	240	1,165	599	83	754	261	154	[b]	38	532	74	138	64	469	[b]
2014	189	[b]	622	[b]	3,201	1,220	497	80	200	[b]	359	340	[b]	1,865	[b]
Escapement Goal			400-1,200		1,200-2,300		330-1,200			970-2,100	300-830	340-1,300		470-1,600	
10-yr avg	1,670	3,235	1,771	444	3,746	1,160	1,231	462	312	2,052	422	497	200	845	235

[a] Estimates are from aerial surveys conducted during peak spawning periods under good or fair survey conditions.

[b] Survey was either not flown or did not meet acceptable survey criteria.

81

APPENDIX C



Appendix C1.–Map of Commercial Fishing District W-4, Quinhagak, Kuskokwim Management Area.

Appendix C2.–Commercial salmon harvest, including personal use, District 4, Quinhagak, Kuskokwim Bay, 1960–2014.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960	0	5,649	3,000	0	0	8,649
1961	4,328	2,308	46	90	18,864	25,636
1962	5,526	10,313	0	4,340	45,707	65,886
1963	6,555	0	0	0	0	6,555
1964	4,081	13,422	379	939	707	19,528
1965	2,976	1,886	0	0	4,242	9,104
1966	278	1,030	0	268	2,610	4,186
1967	0	652	1,926	0	8,087	10,665
1968	8,879	5,884	21,511	75,818	19,497	131,589
1969	16,802	3,784	15,077	953	38,206	74,822
1970	18,269	5,393	16,850	15,195	46,556	102,263
1971	4,185	3,118	2,982	13	30,208	40,506
1972	15,880	3,286	376	1,878	17,247	38,667
1973	14,993	2,783	16,515	277	19,680	54,248
1974	8,704	19,510	10,979	43,642	15,298	98,133
1975	3,928	8,584	10,742	486	35,233	58,973
1976	14,110	6,090	13,777	31,412	43,659	109,048
1977	19,090	5,519	9,028	202	43,707	77,546
1978	12,335	7,589	20,114	47,033	24,798	111,869
1979	11,144	18,828	47,525	295	25,995	103,787
1980	10,387	13,221	62,610	21,671	65,984	173,873
1981	24,524	17,292	47,551	160	53,334	142,861
1982	22,106	25,685	73,652	11,838	34,346	167,627
1983	46,385	10,263	32,442	168	23,090	112,348
1984	33,663	17,255	132,151	16,249	50,422	249,740
1985	30,401	7,876	29,992	28	20,418	88,715
1986	22,835	21,484	57,544	8,700	29,700	140,263
1987	26,022	6,489	50,070	66	8,557	91,204
1988	13,883	21,556	68,605	21,311	29,220	154,575
1989	20,820	20,582	44,607	273	39,395	125,677
1990	27,644	83,681	26,926	12,056	47,717	198,024
1991	9,480	53,657	42,571	115	54,493	160,316
1992	17,197	60,929	86,404	64,217	73,383	302,130
1993	15,784	80,934	55,817	7	40,943	193,485
1994	8,564	72,314	83,912	35,904	61,301	261,995
1995	38,584	68,194	66,203	186	81,462	254,629
1996	14,165	57,665	118,718	20	83,005 [a]	273,573
1997	35,510	69,562	32,862	5	38,445	176,384
1998	23,158	41,382	80,183	2,217	45,095	192,035
1999	18,426	41,315	6,184	0	38,091	104,016
2000	21,229	68,557	30,529	3	30,553	150,871
2001	12,775	33,807	18,531	0	17,209	82,322
2002	11,480	17,802	26,695	0	29,252	85,229
2003	14,444	33,941	49,833	0	27,868	126,086
2004	25,462	34,627	82,398	0	25,820	168,307

-continued-

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
2005	24,195	68,801	51,708	19	13,529	158,252
2006	19,184	106,308	26,831	0	39,151	191,474
2007	19,573	109,343	34,710	0	61,228	224,854
2008	13,812	69,743	94,257	0	57,033	234,845
2009	13,920	112,153	48,115	0	91,158	265,346
2010	14,230	138,362	13,690	0	106,610	272,892
2011	15,387	38,543	30,457	0	104,959	189,346
2012	6,675	37,688	31,214	0	61,140	136,717
2013	2,054	26,393	21,126	0	58,079	107,652
2014	2,265	58,879	52,317	0	14,563	128,024
Average 2004–2013	15,449	74,196	43,451	2	61,871	194,969

[a] Estimate of chum roe included.

Appendix C3.–Commercial salmon fishing exvessel value, District 4, Quinhagak, Kuskokwim Bay, 1990–2014.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	$253,562	$542,485	$123,936	$4,146	$89,343	$1,013,472
1991	$94,950	$246,734	$144,379	$52	$106,321	$592,436
1992	$166,471	$368,310	$303,740	$15,875	$139,268	$993,664
1993	$143,506	$402,763	$246,746	$4	$105,236	$898,255
1994	$67,584	$253,922	$420,802	$10,454	$84,395	$837,157
1995	$418,067	$323,104	$201,413	$81	$104,523	$1,047,188
1996	$61,004	$165,100	$246,930	$6	$61,686	$534,726
1997	$171,688	$204,190	$91,584	$0	$29,609	$497,071
1998	$82,168	$150,631	$197,676	$871	$36,497	$467,843
1999	$94,880	$140,846	$14,997	$0	$28,368	$279,091
2000	$131,351	$249,382	$31,898	$1	$23,929	$436,561
2001	$93,697	$89,334	$32,577	$0	$13,007	$228,615
2002	$56,356	$40,368	$47,651	$0	$23,374	$167,749
2003	$69,201	$107,287	$108,804	$0	$19,261	$304,553
2004	$107,700	$77,394	$201,879	$0	$18,372	$405,345
2005	$221,854	$241,478	$101,776	$4	$6,853	$571,965
2006	$147,802	$327,917	$61,433	$0	$14,030	$551,182
2007	$163,248	$374,004	$102,569	$0	$21,044	$660,865
2008	$140,580	$272,427	$317,143	$0	$20,581	$750,731
2009	$130,561	$384,209	$136,562	$0	$95,993	$747,325
2010	$294,163	$1,049,395	$117,658	$0	$194,105	$1,655,321
2011	$166,606	$207,642	$198,333	$0	$603,855	$1,176,436
2012	$85,934	$208,023	$167,638	$0	$362,840	$824,435
2013	$35,126	$154,135	$172,739	$0	$399,537	$761,537
2014	$22,940	$408,008	$367,817	$0	$59,873	$858,639
Average 2004–2013	$149,357	$329,662	$157,773	$0	$173,721	$810,514

Appendix C4.–Commercial salmon harvest by period, District 4, Quinhagak, Kuskokwim Bay, 2014.

	Permits		Number of salmon				
Date	fished	Landings	Chinook	Sockeye	Coho	Chum	Total
Jul 9	132	191	701	12,183	0	2,194	15,078
Jul 11	121	167	616	11,651	0	2,274	14,541
Jul 14	100	161	285	11,263	0	2,660	14,208
Jul 16	115	149	230	8,387	13	1,943	10,573
Jul 18	69	88	114	5,078	20	1,208	6,420
Jul 21	62	69	77	3,437	47	1,263	4,824
Jul 23	64	69	51	2,321	71	857	3,300
Jul 25	65	77	53	1,802	180	1,007	3,042
Aug 4	86	89	33	741	2,935	308	4,017
Aug 6	82	113	27	557	5,546	279	6,409
Aug 8	82	89	26	425	4,682	167	5,300
Aug 11	64	97	14	299	5,500	112	5,925
Aug 13	96	122	12	238	7,333	113	7,696
Aug 15	73	99	11	249	6,579	70	6,909
Aug 18	58	67	5	134	4,874	48	5,061
Aug 22	67	97	2	39	6,641	16	6,698
Aug 25	68	97	3	44	5,249	23	5,319
Aug 27	47	62	5	31	2,647	21	2,704
Total	194	1,903	2,265	58,879	52,317	14,563	128,024

Appendix C5.–Salmon spawning escapement, Kanektok River, Kuskokwim Bay, 1996−2014.

Year	Operating Period [a]	Chinook	Sockeye	Coho	Pink [b]	Chum
Kanektok River						
Counting Tower						
1996	7/2–7/13; 7/20–7/25	[c]	[c]			[c]
1997	6/11–8/21	16,731	96,348	[c]	7,872	51,180
1998	7/23–8/17	[c]	[c]	[c]	[c]	[c]
1999			Not operational			
2000			Not operational			
Weir						
2001	8/10–10/03	2,795 [c]	9,912 [c]	32,720	14	9,021 [c]
2002	7/01–9/20	5,360 [d]	60,733 [d]	24,840	85,057	41,912 [d]
2003	6/24–9/18	8,290	129,449	72,448	2,301	40,086
2004	6/29–9/20	19,745	106,409	87,827	89,138	46,008
2005	6/25–9/18	14,233	270,379	13,700 [e]	3,511	55,340
2006			Not operational			
2007	6/19–9/18	14,120	308,351	26,452	3,032	131,055
2008	7/17–8/21	9,799 [d]	86,245 [e]	24,490 [d]	140,468	53,605 [d]
2009	7/05–8/11	7,065	305,756 [d]	2,336 [c]	1,246	55,846 [d]
2010	6/28–8/05	6,537	204,954	330 [c]	114,074	68,186
2011	6/27–8/15	5,170	88,177	5,779 [c]	530	53,050
2012	7/06–8/15	1,561 [a]	115,021 [e]	4,248 [c]	62,141	28,726 [a]
2013	6/25–8/15	3,569	128,761	3,116 [c]	532	43,040
2014	6/25–8/15	3,594	259,406	4,786 [c]	25,718	18,602

[a] The operational period is inclusive of days when passage was estimated; unless otherwise noted, less than 20% of the total annual escapement is estimated.

[b] Pink salmon numbers represent actual counts. No estimates of missed escapement, because picket spacing allowed unmonitored small pink salmon to pass.

[c] Field operations were incomplete and total annual escapement was not estimated.

[d] Field operations were incomplete; sum of daily counts is an underestimate of total escapement, but considered reasonable. Additional estimates were not made.

[e] Field operations were incomplete; more than 20% of the total estimate is based on daily passage estimates.

Appendix C6.–Salmon spawning aerial survey index estimates, Kanektok River, Kuskokwim Bay drainage, 1962−2014.

Year	Chinook	Sockeye	Coho	Chum
1962		[a]	[a]	[a]
1963	[a]	[a]	[a]	[a]
1964	[a]	[a]	[a]	[a]
1965	[a]	[a]	[a]	[a]
1966	3,718	[a]	28,800	[a]
1967	[a]	[a]	[a]	[a]
1968	[a]	[a]	14,000	[a]
1969	[a]	[a]	[a]	[a]
1970	3,112	[a]	[a]	[a]
1971	[a]	[a]	[a]	[a]
1972	[a]	[a]	[a]	[a]
1973	[a]	[a]	[a]	[a]
1974	[a]	[a]	[a]	[a]
1975	[a]	[a]	[a]	[a]
1976	[a]	[a]	8,697	[a]
1977	5,787	6,404	32,157	[a]
1978	19,180	42,890	229,290 [b]	[a]
1979	[a]	[a]	[a]	[a]
1980	6,172	112,501	[a]	[a]
1981	[a]	[a]	25,950	69,325
1982	[a]	[a]	71,840	[a]
1983	8,890	[a]	[a]	[a]
1984	12,182	30,840	9,360	[a]
1985	13,465	15,570	53,060	46,830
1986	3,643	12,090	14,385	[a]
1987	4,213	51,753	16,790	[a]
1988	11,180	30,440	9,420	20,056
1989	7,914	14,735	20,583	[a]
1990	[a]	[a]	6,270	[a]
1991	[a]	[a]	2,475	[a]
1992	[a]	[a]	[a]	4,330
1993	[a]	[a]	25,675	[a]
1994	7,386	[a]	1,285	[a]
1995	[a]	[a]	10,000	[a]
1996	[a]	[a]	[a]	23,656 [a]
1997	[a]	[a]	[a]	[a]
1998	[a]	[a]	[a]	[a]
1999	[a]	[a]	[a]	[a]
2000	[a]	[a]	[a]	[a]
2001	[a]	[a]	11,440	[a]
2002	[a]	[a]	[a]	[a]
2003	6,206	21,335	[a]	[a]
2004	28,375	77,780	[a]	[a]
2005	12,780	95,900	[a]	[a]
2006	[a]	[a]	[a]	[a]
2007	[a]	[a]	[a]	[a]

-continued-

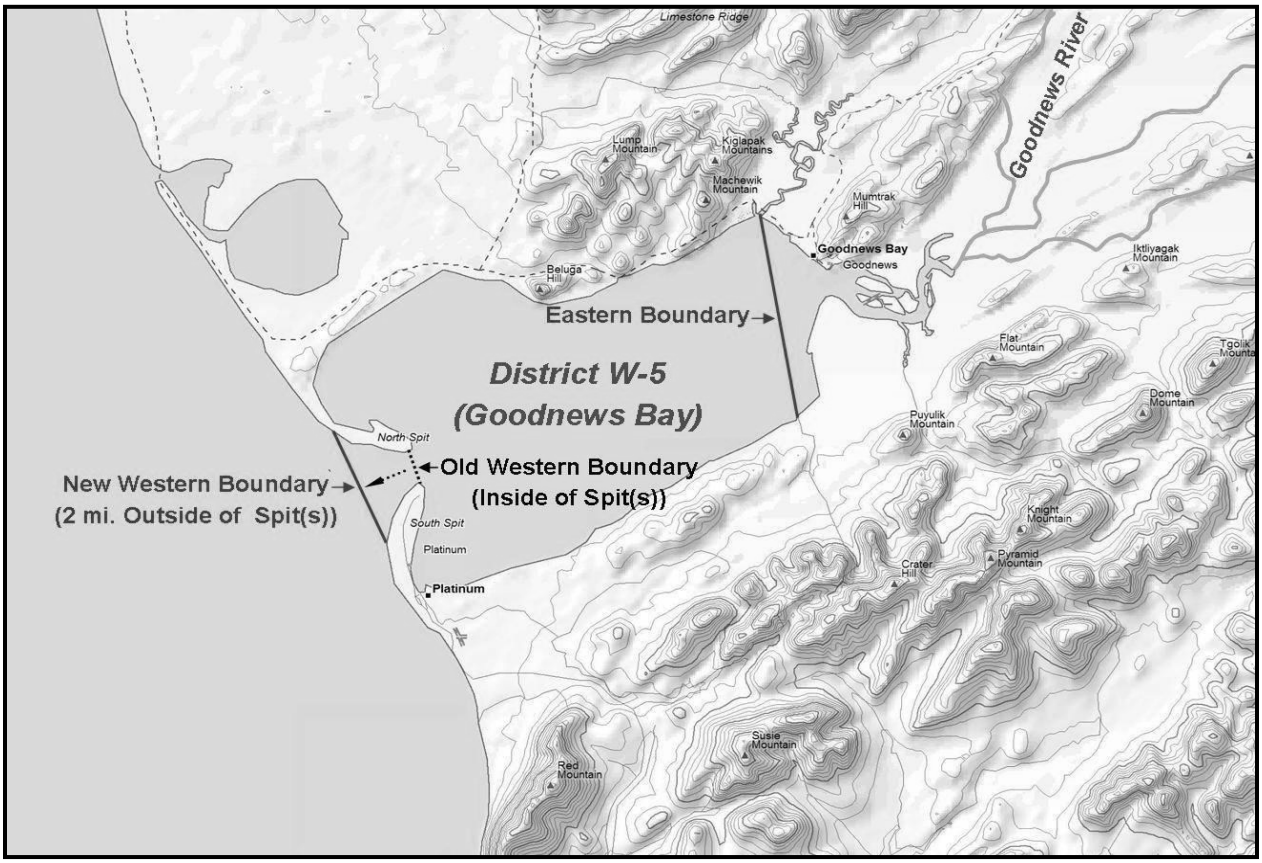
Appendix C6.–Page 2 of 2.

Year	Chinook	Sockeye	Coho	Chum
2008	[a]	[a]	[a]	[a]
2009	[a]	[a]	[a]	[a]
2010	1,208	16,180	[a]	[a]
2011	[a]	[a]	[a]	[a]
2012	[a]	[a]	[a]	[a]
2013	2,277	51,517	[a]	[a]
2014	[a]	136,400	[a]	[a]
SEG	3,500–8,000	14,000–34,000	>5,200	

Note: Aerial surveys are those rated as fair to good, obtained between 20 July and 5 August for Chinook and sockeye salmon, 20-31 July for chum salmon, and 20 August and 5 September for coho salmon.

[a] Survey either not flown or did not meet acceptable survey criteria.

APPENDIX D



Appendix D1.–Map of Commercial Fishing District W-5, Goodnews Bay, Kuskokwim Management Area.

Appendix D2.–Commercial salmon harvests, including personal use, District W-5 Goodnews Bay, Kuskokwim Bay, 1968–2014.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1968	[a]	[a]	5,458	[a]	[a]	5,458
1969	3,978	6,256	11,631	298	5,006	27,169
1970	7,163	7,144	6,794	12,183	12,346	45,630
1971	477	330	1,771	0	301	2,879
1972	264	924	925	66	1,331	3,510
1973	3,543	2,072	5,017	324	15,781	26,737
1974	3,302	9,357	21,340	16,373	8,942	59,314
1975	2,156	9,098	17,889	419	5,904	35,466
1976	4,417	5,575	9,852	8,453	10,354	38,651
1977	3,336	3,723	13,335	29	6,531	26,954
1978	5,218	5,412	13,764	9,103	8,590	42,087
1979	3,204	19,581	42,098	201	9,298	74,382
1980	2,331	28,632	43,256	7,832	11,748	93,799
1981	7,190	40,273	19,749	11	13,642	80,865
1982	9,476	38,877	46,683	4,673	13,829	113,538
1983	14,117	11,716	19,660	0	6,766	52,259
1984	8,612	15,474	71,176	4,711	14,340	114,313
1985	5,793	6,698	16,498	8	4,784	33,781
1986	2,723	25,112	19,378	4,439	10,356	62,008
1987	3,357	27,758	29,057	54	20,381	80,607
1988	4,964	36,368	30,832	5,509	33,059	110,732
1989	2,966	19,299	31,849	82	13,622	67,818
1990	3,303	35,823	7,804	629	13,194	60,753
1991	912	39,838	13,312	29	15,892	69,983
1992	3,528	39,194	19,875	14,310	18,520	95,427
1993	2,117	59,293	20,014	0	10,657	92,081
1994	2,570	69,490	47,499	18,017	28,477	166,053
1995	2,922	37,351	17,875	39	19,832	78,019
1996	1,375	30,717	43,836	22	11,093	87,043
1997	2,039	31,451	2,983	0	11,729	48,202
1998	3,675	27,161	21,246	411	14,155	66,648
1999	1,888	22,910	2,474	0	11,562	38,834
2000	4,442	37,252	15,531	7	7,450	64,682
2001	1,519	25,654	9,275	0	3,412	39,860
2002	979	6,304	3,041	0	3,799	14,123
2003	1,412	29,423	12,658	0	5,593	49,086
2004	2,565	20,523	24,089	0	5,965	53,142
2005	2,035	23,933	11,735	0	2,568	40,271
2006	2,899	29,858	12,438	0	11,678	56,873
2007	3,126	43,766	13,697	6	7,853	68,448
2008	1,281	27,237	22,547	0	10,408	61,473
2009	1,509	32,544	8,406	0	16,985	59,444
2010	1,759	41,074	4,900	0	26,914	74,647

-continued-

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
2011	2,092	24,573	15,358	0	13,191	55,214
2012	1,536	50,647	25,515	0	24,487	102,185
2013	495	24,521	21,582	0	12,651	59,249
2014	205	20,515	52,158	0	3,403	76,281
Average 2004–2013	1,930	31,868	16,027	1	13,270	63,095

[a] No harvest information available.

Appendix D3.–Commercial salmon fishing exvessel value, District W-5 Goodnews Bay, Kuskokwim Bay, 1990–2014.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	$32,135	$263,598	$38,910	$254	$25,767	$360,664
1991	$8,370	$187,622	$47,519	$14	$31,394	$274,919
1992	$30,688	$257,457	$75,278	$2,913	$39,111	$405,447
1993	$21,351	$296,437	$95,043	$0	$28,304	$441,135
1994	$21,732	$309,577	$271,687	$5,442	$41,309	$649,747
1995	$31,339	$175,552	$58,061	$19	$21,427	$286,398
1996	$5,952	$87,427	$120,191	$4	$9,015	$222,589
1997	$10,867	$93,146	$9,497	$0	$9,358	$122,868
1998	$13,685	$100,171	$59,102	$174	$11,133	$184,265
1999	$9,020	$78,800	$7,515	$0	$8,327	$103,662
2000	$25,614	$146,708	$34,689	$2	$6,001	$213,014
2001	$10,496	$68,678	$17,089	$0	$2,586	$98,849
2002	$343	$15,846	$5,634	$0	$2,979	$24,802
2003	$6,461	$95,818	$28,945	$0	$3,883	$135,107
2004	$10,857	$49,741	$70,404	$0	$4,244	$135,246
2005	$16,696	$91,135	$25,010	$0	$1,454	$134,295
2006	$21,314	$87,996	$27,587	$0	$4,368	$141,265
2007	$23,951	$156,802	$38,796	$0	$2,781	$222,330
2008	$13,181	$104,296	$76,683	$0	$3,910	$198,070
2009	$13,333	$134,244	$25,456	$0	$18,998	$192,031
2010	$44,910	$334,366	$44,706	$0	$46,679	$470,661
2011	$19,224	$141,347	$106,471	$0	$78,980	$346,022
2012	$20,509	$299,187	$15,668	$0	$147,401	$482,765
2013	$8,546	$169,318	$185,332	$0	$89,455	$452,651
2014	$3,065	$152,446	$406,843	$0	$14,134	$576,488
Average 2004–2013	$19,252	$156,843	$61,611	$0	$39,827	$277,534

Appendix D4.–Commercial salmon harvest by period, District W-5 Goodnews Bay, Kuskokwim Bay, 2014.

	Permits		Number of salmon				
Date	fished	Landings	Chinook	Sockeye	Coho	Chum	Total
Jul 9	23	36	52	4,691	0	832	5,575
Jul 11	24	30	41	3,124	0	635	3,800
Jul 14	34	42	40	3,219	0	509	3,768
Jul 16	32	36	17	2,737	2	469	3,225
Jul 18	26	26	12	1,424	3	255	1,694
Jul 21	25	26	12	1,434	9	264	1,719
Jul 25	22	22	8	859	74	185	1,126
Aug 4	19	20	2	562	865	52	1,481
Aug 6	26	26	1	491	1,332	30	1,854
Aug 8	29	30	2	435	2,428	39	2,904
Aug 11	36	53	4	336	5,528	54	5,922
Aug 13	37	53	7	446	5,363	23	5,839
Aug 15	39	63	5	410	7,329	22	7,766
Aug 18	25	48	2	95	5,647	11	5,755
Aug 22	29	58	0	111	8,456	10	8,577
Aug 25	38	68	0	89	9,045	9	9,143
Aug 27	41	50	0	52	6,077	4	6,133
Total	61	687	205	20,515	52,158	3,403	76,281

Appendix D5.–Salmon spawning escapement, Middle Fork Goodnews River, Kuskokwim Bay drainage, 1981–2014.

Year	Operating Period [a]	Chinook	Sockeye	Coho	Pink [b]	Chum
Counting Tower						
1981	6/13–8/15	3,688	49,108	[c]	1,327	21,827
1982	6/23–8/03	1,395	56,255	[c]	13,855	6,767
1983	6/11–7/28	6,027	25,816	[c]	102	15,548
1984	6/15–7/31	3,260	32,053	[c]	13,744	19,003
1985	6/27–7/31	2,831	24,131	[c]	144	10,367
1986	6/16–7/24	2,080	51,069	[c]	8,134	14,764
1987	6/22–7/30	2,272	28,871	[c]	71	17,517
1988	6/23–7/30	2,712	15,799	[c]	6,781	20,799
1989	6/29–7/31	1,915	21,186	[c]	246	10,380
1990	6/19–7/24	3,636	31,679	[c]	3,378	6,410
Weir						
1991	6/29–8/24	2,080	41,656 [d]	2,410 [c]	1,428	27,632
1992	6/29–8/25	1,445 [d]	28,074	151 [c]	21,523	21,096
1993	6/22–8/18	2,132	24,957 [e]	1,593 [c]	318	14,581
1994	6/23–8/08	3,061	56,503	256 [c]	38,710	35,652 [d]
1995	6/19–8/28	4,678	37,776	11,556 [c]	312	33,559
1996	6/19–8/23	3,282 [d]	64,185	17,753 [c]	14,509	46,108 [d]
1997	6/11–9/17	2,897	34,322	13,404	940	17,151
1998	7/04–9/13	3,553	38,493 [d]	33,368	10,376	26,996
1999	6/26–9/26	3,703	49,323	11,500	910	21,818
2000	7/02–9/22	2,670 [e]	40,828 [e]	15,880 [e]	2,528	14,405 [e]
2001	6/26–9/30	5,351 [e]	21,197 [e]	18,539 [e]	1,326	26,820 [e]
2002	6/22–9/18	3,025	21,329	27,643	3,034	29,905
2003	6/18–9/18	2,248	37,933	52,504	1,864	21,778
2004	6/21–9/20	4,438	54,047	47,916	21,628	32,443
2005	6/26–9/20	4,781	118,969	20,168	5,926	26,501
2006	6/26–9/18	4,572	127,245	26,909	18,432	54,689
2007	6/25–9/19	3,914	73,768	19,442 [d]	4,919	50,232
2008	7/02–9/16	2,223	43,879 [d]	37,690	9,807	39,548 [d]
2009	6/28–9/22	1,669	27,495	19,699	714	19,237
2010	6/25–9/18	2,176	36,574	26,287 [d]	3,444	24,789
2011	6/24–9/18	2,045	19,643	24,668	1,394	19,974
2012	6/29–9/03	524 [d]	29,531 [a]	11,371 [a]	6,316	9,065 [d]
2013	6/25–9/18	1,187	23,545	1,189 [d]	530	27,682
2014	6/25–8/30	750	41,473	7,594	0	11,518
		BEG 1,500-2,900	BEG 18,000-40,000	SEG >12,000		SEG >12,000

[a] The operational period is inclusive of days when passage was estimated; unless otherwise noted less than 20% of the total annual escapement is estimated.

[b] Pink salmon numbers represent actual counts. No estimates of missed escapement, because picket spacing allowed unmonitored small pink salmon to pass.

[c] Field operations were incomplete and total annual escapement was not estimated.

[d] Field operations were incomplete; sum of daily counts is an underestimate of total escapement, but considered reasonable. Additional estimates were not made.

[e] Field operations were incomplete; more than 20% of the total estimate is based on daily passage estimates.

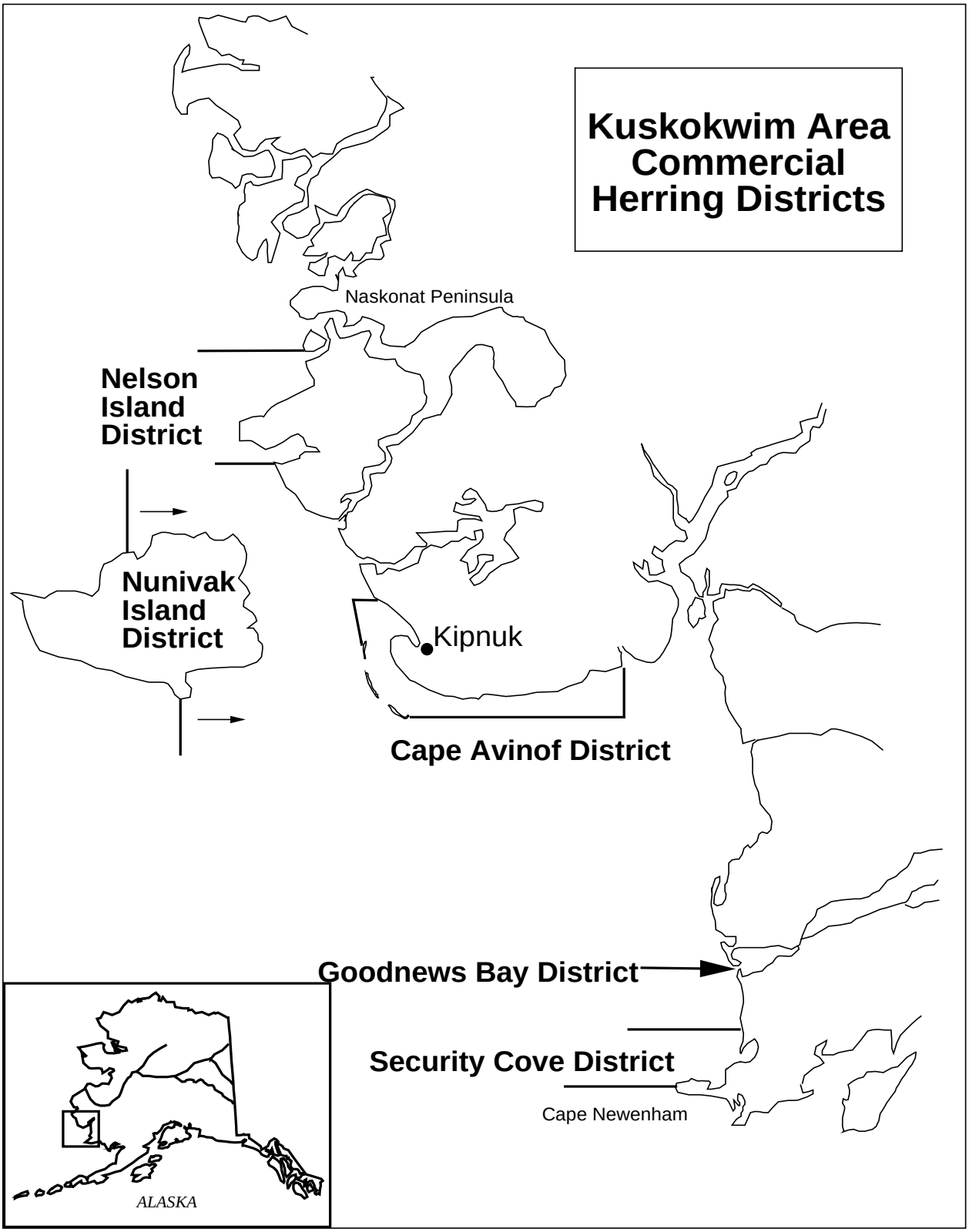
Appendix D6.–Salmon spawning aerial survey index estimates, Goodnews rivers and lakes, Kuskokwim Bay drainage, 1980–2014.

	Goodnews River and Lakes			Middle Fork Goodnews River and Lakes		
Year	Chinook	Sockeye	Chum	Chinook	Sockeye	Chum
1980	1,228	75,639	1,975	1,164	[a]	3,782
1981	[a]	[a]	[a]	[a]	[a]	[a]
1982	[a]	[a]	9,700	[a]	[a]	6,300
1983	2,600	9,650	[a]	[a]	[a]	a
1984	2,062	12,807	17,250	905	8,546	9,172
1985	3,535	4,620	4,415	2,050	7,401	3,593
1986	1,068	8,960	11,850	1,249	16,990	7,645
1987	2,244	19,786	12,148	2,222	25,340	9,789
1988	[a]	[a]	[a]	[a]	[a]	[a]
1989	651	[a]	[a]	1,277	30,382	[a]
1990	658	27,689	[a]	[a]	[a]	[a]
1991	[a]	[a]	[a]	[a]	[a]	[a]
1992	875	[a]	1,950	[a]	[a]	3,270
1993	[a]	[a]	[a]	[a]	[a]	[a]
1994	[a]	[a]	[a]	[a]	[a]	[a]
1995	3,314	[a]	[a]	[a]	[a]	[a]
1996	[a]	[a]	[a]	[a]	[a]	[a]
1997	[a]	[a]	[a]	[a]	[a]	[a]
1998	578	3,497	2,743	731	11,393	3,619
1999	[a]	[a]	[a]	[a]	[a]	[a]
2000	[a]	[a]	[a]	[a]	[a]	[a]
2001	[a]	[a]	7,330	[a]	[a]	6,945
2002	1,470	[a]	3,075	1,195	2,627	1,208
2003	3,935	50,140	[a]	2,131	29,150	[a]
2004	7,482	31,695	[a]	2,617	33,670	[a]
2005	[a]	[a]	[a]	[a]	[a]	[a]
2006	[a]	[a]	[a]	[a]	[a]	[a]
2007	[a]	[a]	[a]	[a]	[a]	[a]
2008	2,155	32,500	[a]	2,190	13,935	[a]
2009	[a]	[a]	[a]	[a]	[a]	[a]
2010	[a]	[a]	[a]	[a]	[a]	[a]
2011	853	14,140	[a]	[a]	[a]	[a]
2012	378	16,710	[a]	355	[a]	[a]
2013	[a]	[a]	[a]	[a]	[a]	[a]
2014	630	[a]	[a]	612	12,262	[a]
SEG	640–3,300	5,500–19,500	[b]	[b]	[b]	[b]

[a] Survey was either not flown or not rated as acceptable.

[b] Aerial survey escapement goal was discontinued in 2004.

APPENDIX E



Appendix E1.–Commercial Herring Districts, Kuskokwim Management Area.

Appendix E2.–Estimated biomass, commercial harvest, effort and value of Pacific herring in Kuskokwim Area fishing districts, Alaska, 1981–2014.

Year	District	Estimated biomass (st)		Harvest (st)	Number of permits	Hours fished	CPUE (st)	Estimated value [a]	Average income per permit
2014	Security Cove	15,874		0	0	0		$0	$0
	Goodnews Bay	14,162		0	0	0		$0	$0
	Cape Avinof	10,423	[a]	0	0	0		$0	$0
	Nelson Is.	58,285		0	0	0		$0	$0
	Nunivak Is.	2,280	[a]	0	0	0		$0	$0
2013	Security Cove	9,313		0	0	0		$0	$0
	Goodnews Bay	7,945		255	5	348		$38,235	$7,647
	Cape Avinof	1,415	[a]	36	11	72		$5,430	$494
	Nelson Is.	4,893		355	12	168		$53,190	$4,433
	Nunivak Is.	2,420	[a]	0	0	0		$0	$0
2012	Security Cove	12,193	[a]	0	0	0		$0	$0
	Goodnews Bay	33,008	[a]	0	0	0		$0	$0
	Cape Avinof	2,095	[a]	0	0	0		$0	$0
	Nelson Is.	4,703	[a]	0	0	0		$0	$0
	Nunivak Is.	2,879	[a]	0	0	0		$0	$0
2011	Security Cove	13,119	[a]	0	0	0		$0	$0
	Goodnews Bay	36,810	[a]	0	0	0		$0	$0
	Cape Avinof	2,324	[a]	0	0	0		$0	$0
	Nelson Is.	5,252	[a]	0	0	0		$0	$0
	Nunivak Is.	3,322	[a]	0	0	0		$0	$0
2010	Security Cove	13,440		0	0	0		$0	$0
	Goodnews Bay	33,490	[b]	0	0	0		$0	$0
	Cape Avinof	2,393	[a]	0	0	0		$0	$0
	Nelson Is.	5,449	[a]	0	0	0		$0	$0
	Nunivak Is.	31,141	[a]	0	0	0		$0	$0
2009	Security Cove	5,686	[a]	0	0	0		$0	$0
	Goodnews Bay	6,143		0	0	0		$0	$0
	Cape Avinof	2,251	[a]	0	0	0		$0	$0
	Nelson Is.	5,152	[a]	0	0	0		$0	$0
	Nunivak Is.	3,141	[a]	0	0	0		$0	$0
2008	Security Cove	6,442		0	0	0		$0	$0
	Goodnews Bay	3,259		0	0	0		$0	$0
	Cape Avinof	806		0	0	0		$0	$0
	Nelson Is.	3,424		0	0	0		$0	$0
	Nunivak Is.	3,688		0	0	0		$0	$0

-continued-

Year	District	Estimated biomass (st)	Harvest (st)	Number of permits	Hours fished	CPUE (st)	Estimated value [a]	Average income per permit
2007	Security Cove	7,081	0	0	0		$0	$0
	Goodnews Bay	3,683	0	0	0		$0	$0
	Cape Avinof	878	0	0	0		$0	$0
	Nelson Is.	3,614	0	0	0		$0	$0
	Nunivak Is.	4,054	0	0	0		$0	$0
2006	Security Cove	7,477	64	2	156		$7,878	$3,939
	Goodnews Bay	4,111	64	5	96		$8,935	$1,787
	Cape Avinof	702	0	0	0		$0	$0
	Nelson Is.	3,809	262	25	169		$53,225	$2,129
	Nunivak Is.	4,260	0	0	0		$0	$0
2005	Security Cove	18,192	2,031	30	198		$317,153	$10,572
	Goodnews Bay	13,410	49	6	123		$4,321	$720
	Cape Avinof	3,377	149	14	160		$37,631	$2,688
	Nelson Is.	4,440	665	27	277		$119,193	$4,415
	Nunivak Is.	4,782	0	0	0.0		$0	$0
2004	Security Cove	9,698	0	0	0		$0	$0
	Goodnews Bay	7,744	34	10	96.0		$3,600	$360
	Cape Avinof	3,369	63	23	288.5		$10,900	$474
	Nelson Is.	5,085	825	39	194.5		$165,300	$4,238
	Nunivak Is.	4,739	0	0	816.0		$0	$0
2003	Security Cove	10,600	0	0	0		$0	$0
	Goodnews Bay	8,300	36	12	50.5	0.06	$4,600	$383
	Cape Avinof	3,812	176	22	74.5	0.11	$36,100	$1,641
	Nelson Is.	6,130	816	44	78.0	0.24	$187,500	$4,261
	Nunivak Is.	5,182	229	19	204.0	[b]	$7,200	$379
2002	Security Cove	4,748	109	25	17.0	0.27	$10,000	$400
	Goodnews Bay	5,529	13	5	28.5	0.09	$1,000	$200
	Cape Avinof	3,491	79	37	97.0	0.02	$8,000	$216
	Nelson Is.	6,130	950	54	80.5	0.22	$101,000	$1,870
	Nunivak Is.	5,422	175	29	243.0	[b]	$19,000	$655
2001	Security Cove	5,206	1,024	56	17.5	1.04	$110,000	$1,964
	Goodnews Bay	5,755	45	23	16.0	0.12	$6,000	$261
	Cape Avinof	3,486	231	45	63.0	0.08	$23,000	$511
	Nelson Is.	6,057	678	49	25.5	0.54	$66,000	$1,347
	Nunivak Is.	5,657	0	0	0		$0	$0

-continued-

Year	District	Estimated biomass (st)	Harvest (st)	Number of permits	Hours fished	CPUE (st)	Estimated value [a]	Average income per permit
2000	Security Cove	5,237	284	79	16.0	0.22	$54,386	$688
	Goodnews Bay	6,348	20	57	27.0	0.01	$3,318	$58
	Cape Avinof	3,210	366	86	59.0	0.07	$68,532	$797
	Nelson Is.	4,672	813	86	20.0	0.47	$154,280	$1,794
	Nunivak Is.	3,487	40	34	93.0	[b]	$11,880	$349
1999	Security Cove	5,261	1,072	97	9.0	1.23	$338,000	$3,485
	Goodnews Bay	6,896	1,366	94	49.0	0.30	$301,000	$3,202
	Cape Avinof	3,555	533	117	51.0	0.09	$185,000	$1,581
	Nelson Is.	6,655	1,366	94	22.0	0.66	$430,000	$4,574
	Nunivak Is.	3,319	0	0	0		$0	$0
1998	Security Cove	4,017	1,012	78	28.5	0.46	$202,340	$2,594
	Goodnews Bay	4,064	831	84	79.0	0.13	$166,220	$1,979
	Cape Avinof	4,287	656	109	44.0	0.14	$131,120	$1,203
	Nelson Is.	7,136	1,250	86	76.0	0.19	$235,900	$2,743
	Nunivak Is.	3,778	202	7	6.0	4.81	$440	$63
1997	Security Cove	4,640	892	222	10.5	0.38	$221,000	$995
	Goodnews Bay	4,752	805	139	65.0	0.09	$228,000	$1,640
	Cape Avinof	4,616	687	145	26.0	0.18	$157,000	$1,083
	Nelson Is.	7,909	778	105	10.0	0.74	$198,000	$1,886
	Nunivak Is.	3,801	0	12	70.0	0.00	$0	$0
1996	Security Cove	6,867	1,859	326	5.5	1.04	$1,252,270	$3,841
	Goodnews Bay	6,315	1,204	182	45.0	0.15	$893,900	$4,912
	Cape Avinof	4,500	820	161	57.0	0.09	$659,280	$4,095
	Nelson Is.	6,638	1,031	109	25.0	0.38	$676,624	$6,208
	Nunivak Is.	4,197	101	24	256.0	0.02	$38,234	$1,593
1995	Security Cove	6,702	1,292	106	12.0	1.02	$956,000	$9,019
	Goodnews Bay	4,224	1,054	127	56.0	0.15	$848,000	$6,677
	Cape Avinof	3,627	485	93	48.0	0.11	$363,000	$3,903
	Nelson Is.	7,754	1,113	100	28.0	0.40	$710,000	$7,100
	Nunivak Is.	4,579	41	13	387.0	0.01	$22,000	$1,692
1994	Security Cove	7,638	0	0	0		$0	$0
	Goodnews Bay	5,679	1,062	103	38.0	0.27	$391,000	$3,796
	Cape Avinof	2,827	427	85	62.0	0.08	$156,000	$1,835
	Nelson Is.	5,564	717	104	26.0	0.27	$235,000	$2,260
	Nunivak Is.	4,921	14	12	6.0	0.19	$4,000	$333

-continued-

Year	District	Estimated biomass (st)	Harvest (st)	Number of permits	Hours fished	CPUE (st)	Estimated value [a]	Average income per permit
1993	Security Cove	6,995	5	9	24.5	0.02	$2,000	$222
	Goodnews Bay	6,211	954	63	123.0	0.12	$293,000	$4,651
	Cape Avinof	2,837	215	97	106.0	0.02	$75,000	$773
	Nelson Is.	4,944	739	73	63.5	0.16	$198,000	$2,712
	Nunivak Is.	5,176	0	0	0		$0	$0
1992	Security Cove	7,773	834	58	34.0	0.42	$285,000	$4,914
	Goodnews Bay	5,572	740	78	29.0	0.33	$286,000	$3,667
	Cape Avinof	3,446	452	121	12.0	0.31	$178,000	$1,471
	Nelson Is.	5,275	246	85	10.0	0.29	$78,000	$918
	Nunivak Is.	5,703	27	14	6.0	0.32	$4,000	$286
1991	Security Cove	4,434	570	52	12.0	0.91	$208,000	$4,000
	Goodnews Bay	4,387	263	103	4.0	0.64	$93,000	$903
	Cape Avinof	2,083	267	137	28.0	0.07	$94,000	$686
	Nelson Is.	2,385	0	0	0		$0	$0
	Nunivak Is.	3,903	59	17	12.0	0.29	$9,000	$529
1990	Security Cove	2,650	234	52	7.0	0.64	$94,000	$1,808
	Goodnews Bay	2,577	455	126	32.0	0.11	$314,000	$2,492
	Cape Avinof	2,020	50	101	3.0	0.17	$35,000	$347
	Nelson Is.	2,705	0	0	0		$0	$0
	Nunivak Is.	422	0	0	0		$0	$0
1989	Security Cove	2,830	554	104	4.0	1.33	$256,000	$2,462
	Goodnews Bay	4,044	616	138	50.0	0.09	$335,000	$2,428
	Cape Avinof	2,777	129	147	194.0	0.00	$54,000	$367
	Nelson Is.	3,316	233	162	15.0	0.10	$57,000	$352
	Nunivak Is.	617	116	45	186.0	0.01	$42,000	$933
1988	Security Cove	4,906	324	31	23.5	0.44	$362,000	$11,677
	Goodnews Bay	4,479	483	60	40.0	0.20	$463,000	$7,717
	Cape Avinof	4,108	348	98	88.5	0.04	$264,000	$2,694
	Nelson Is.	7,152	775	174	7.5	0.59	$713,000	$4,098
	Nunivak Is.	2,800	0	0	0		$0	$0
1987	Security Cove	2,300	313	65	13.0	0.37	$242,000	$3,723
	Goodnews Bay	2,000	321	117	11.0	0.25	$133,000	$1,137
	Nelson Is.	8,100	923	235	6.0	0.65	$661,000	$2,813
	Nunivak Is.	4,400	414	61	39.0	0.17	$231,000	$3,787
1986	Security Cove	3,700	751	88	73.0	0.12	$535,000	$6,080
	Goodnews Bay	3,000	557	104	53.0	0.10	$325,000	$3,125
	Nelson Is.	7,300	886	163	40.0	0.14	$428,000	$2,626
	Nunivak Is.	6,000	511	36	156.0	0.09	$213,000	$5,917

-continued-

Year	District	Estimated biomass (st)	Harvest (st)	Number of permits	Hours fished	CPUE (st)	Estimated value [a]	Average income per permit
1985	Security Cove	4,900	733	107	125.0	0.05	$335,000	$3,131
	Goodnews Bay	4,300	724	83	130.0	0.07	$309,000	$3,723
	Nelson Is.	9,500	977	143	44.0	0.16	$527,000	$3,685
	Nunivak Is.	5,700	358	37	228.0	0.04	$146,000	$3,946
1984	Security Cove	5,100	335	38	345.0	0.03	$110,000	$2,895
	Goodnews Bay	4,100	717	130	139.0	0.04	$168,000	$1,292
1983	Security Cove	6,400	1,073	94	87.0	0.13	$443,000	$4,713
	Goodnews Bay	3,200	435	84	278.0	0.02	$185,000	$2,202
1982	Security Cove	5,100	813	107	302.0	0.03	$271,000	$2,533
	Goodnews Bay	2,600	486	84	314.0	0.02	$188,000	$2,238
1981	Security Cove	8,300	1,173	113	90.0	0.12	$347,000	$3,071
	Goodnews Bay	4,300	657	175	133.0	0.03	$196,000	$1,120

[a] Estimated biomass is the projection. Aerial surveys were inadequate or not flown.

Appendix E3.–Herring aerial survey abundance estimates, Kuskokwim Management Area, 2014.

District	Date	Rating	Biomass estimate (short ton)
Security Cove	10 May	2	15,874
	13 May	3	6,032
Goodnews Bay	10 May	2	14,162
	13 May	3	1,404
Jacksmith Bay	10 May	4	0
	13 May	4	0
Nelson Island	11 May	3	510
	14 May	3	58,285

Appendix E4.–Age, weight, and length composition of Pacific herring caught by ADF&G variable mesh gillnet (VMG) test fisheries, Goodnews Bay, Kuskokwim Bay, 2014.

Sample dates	Age	Sex (number)			Percent of total	Length average (mm)	Weight average (g)
		Male	Female	Total			
May 9–May 22	4	20	15	35	6.0	248	148
	5	89	78	167	28.8	260	178
	6	31	34	65	11.2	273	215
	7	36	53	89	15.3	289	255
	8	36	36	72	12.4	301	280
	9	28	37	65	11.2	304	305
	10	11	24	35	6.0	316	356
	11	4	7	11	1.9	320	386
	12	4	7	11	1.9	328	384
	13	2	2	4	0.7	338	453
	14	3	1	4	0.7	308	430
	15	0	1	1	0.2	365	457
	16	1	1	2	0.3	343	474
	18	0	1	1	0.2	367	609
	No scale		1	1	0.2	256	177
	No Read	3	14	17	2.9	307	315
Sample total:		268	312	580	100		

Appendix E5.–Age class composition of biomass from samples collected by ADF&G variable mesh gillnet test fisheries, Goodnews Bay, Kuskokwim Bay, 2014.

	Goodnews Bay		
Age	No. in sample	% by weight	Tons
3	0	0.0	0
4	35	6.0	853
5	167	28.7	4,071
6	66	11.4	1,609
7	89	15.3	2,169
8	72	12.4	1,755
9	65	11.2	1,584
10	35	6.0	853
11	11	1.9	268
12	11	1.9	268
13+	12	2.1	293
No Read	18	3.1	439
Total	581		14,162 [a]

[a] Differences in total tons and estimated biomass is attributed to rounding error.

Appendix E6.–Projections of Pacific herring spawning biomass and harvest levels for 2014 season, Kuskokwim Bay.

District	2013 Observed biomass (st)	2014 Projected biomass (st)	2014 Guideline harvest (st)	2014 Observed biomass (st)	Exploitation rate (%)	Threshold [a]
Security Cove	9,313	8,655	1,731	15,874	20	1,200
Goodnews Bay	7,945	7,844	1,569	14,162	20	1,200
Cape Avinof	1,415	1,323	198	10,423	15	500
Nelson Island [b]	4,893	4,279	656	58,285	16[b]	3,000
Nunivak Island	2,420	2,280	456	2,280	20	1,500
Kuskokwim Bay Totals	25,986	24,381	4,610	101,024		

[a] Threshold biomass needed to allow commercial fishery (5 AAC 27.060).

[b] Nelson Island exploitation rate is 20% of projected biomass minus 200 st for subsistence harvest.